CONSUMERS' RESPONSES TO REDUCED PERSONAL SPACE IN A SERVICE SETTING

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Three inter-related studies examined consumers' responses to closely spaced tables during a service experience. The first study evaluated emotional responses to a projected dining experience when dining tables were spaced at one of three distances, and found that diners strongly object to closely spaced tables. The second study solicited emotional and behavioral reactions to tight inter-table spacing during an interactive exercise in a laboratory setting and found that there were minimal effects of reduced personal space on user stress or arousal. The third study tested responses to specific inter-table distances during actual dining experiences in a restaurant. Findings from this third study suggest that consumers in a real service environment are less sensitive to reduced personal space than they are when asked about their feelings toward inter-table spacing before the service takes place. The context of the experience is likely to be a key factor in consumers' preferences for inter-table spacing and subsequent behaviors. The results from this research enhance the understanding of personal space preferences and behaviors in public spaces and may influence the design and management of service environments, specifically restaurants.

BIOGRAPHICAL SKETCH

Stephani Robson is a native of Vancouver, British Columbia. A six-month work experience in a repurposed manor house in Wales during the summer of 1983 cemented her early interest in hospitality, which led to her attending Cornell's School of Hotel Administration for an undergraduate degree which she completed in 1988. For the next few years, Stephani worked as a foodservice facilities designer in Toronto, Ontario, responsible for the planning of commercial kitchens for a variety of hotels, restaurants, universities, stadiums, hospitals, and airports across Canada. In 1993 she returned to Cornell as a visiting lecturer to teach foodservice design. This nine-month appointment soon expanded to three years, followed by a Master of Science degree in Facilities Planning and Management from the Department of Design and Environmental Analysis in the College of Human Ecology. She rejoined the Cornell Hotel School faculty as a full-time lecturer in 1999 and initiated a research stream on the effects of hospitality environments on guest attitudes and behavior. In 2005 she was promoted to Senior Lecturer and embarked upon her doctoral studies while teaching courses in hotel development and planning, restaurant development, and foodservice facilities design.

In addition to her work at Cornell, Stephani is an adjunct faculty member at the French Culinary Institute in New York City. She has taught courses and presented her research in Brazil, India, Italy, Singapore and all across the United States and Canada.

ACKNOWLEDGEMENTS

One's PhD dissertation is only as good as one's committee, and I have been blessed with the best. As a mentor, collaborator, cheerleader and friend, Sherri Kimes has been inspirational and absolutely tireless in her support, no matter where she is in the world. Frank Becker's encouragement and genuine enthusiasm for my work were instrumental to my undertaking the PhD in the first place and to its successful conclusion. Gary Evans offered incredibly valuable suggestions and insights at each stage of the process as well as goodwill and kind words just when they were needed. I am tremendously grateful to all three of these colleagues for everything they have done for me during the PhD and in the years prior.

I particularly wish to thank the management and staff of PUBLIC in New York City for allowing me to use the restaurant for my field study and for being so helpful. Sincere thanks also go to those who helped me conduct the research, work with the data, or polish my writing: Nicole Boosembark, Robert Kwortnik, Russell Lloyd, Kelly McGuire, Amy Newman, Michael Pollak, Suzanne Schechtman, Wayne Taylor and Rohit Verma.

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John, Jordan, Kate, Kay, Kelly, Laurie, Lee, Lisa, Mark Mc and Mark T, Reneta, Sarah, Steve and Steven, Ted, Tom and all my friends in Statler Hall -- I extend the warmest thanks. And finally, I wish to thank my wonderful family for being cheerily accepting of all my foibles and not the slightest bit fazed to discover that I was doing this degree without telling them. We all love happy surprises.

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PREFACE

Responses to reduced personal space have been well studied in a variety of contexts but as yet there has been little work that examines how the presence of strangers in close proximity affects seated hedonic experiences such as those that take place in elective service environments. The work that follows summarizes three inter-related studies that investigated reactions to a projected or actual reduction in personal space specifically to determine whether the distance between dyads seated at neighboring tables has a measurable effect on user attitudes, behavior, or satisfaction.

The theoretical basis for all three studies is the same: spatial intrusion reduces perceived control over access to the self which in turn initiates a stress response. The degree of perceptions of control and any resulting stress response are moderated by individual differences that may be demographic (age, gender, cultural affiliation) or psychographic (locus of control, extraversion) as well as by contextual factors such as the purpose and goals for the experience, its familiarity to the user, and its duration. Stress resulting from diminished perceived control may be manifested as negative affect or as behaviors that limit the potential for interaction with others. Either type of response is undesirable for the providers of hedonic settings.

The first study used projective techniques to prompt consumers' responses to restaurant tables spaced 6, 12 or 24 inches apart under three different dining scenarios. This study was followed by a laboratory-based quasi-experiment that positioned interacting dyads at closely spaced tables and used multiple methods to measure the presence and intensity of stress responses. The third and final study was performed in an upscale restaurant where the distance between dining tables was manipulated over

several evenings and patrons were surveyed regarding their satisfaction with their dining experience in general and their reactions to the table spacing in particular, as well as their future intentions to return or recommend the restaurant to others. These surveys were then combined with actual spending and duration data for each dining party so that the behavioral as well as the emotional effects of table spacing could be assessed.

Together these studies offer a comprehensive, multi-faceted picture of responses to spatial invasion in service settings that offer table seating to their users. The findings presented here contribute to three distinct disciplines:

- environmental psychology, through expanding the understanding of personal space preferences and responses to include multi-dyad environments;
- revenue management, by investigating the role of space as a component of capacity in service experiences; and
- restaurant management, by providing an empirical foundation for recommended inter-table distances in full-service dining environments.

A key strength of this work is that it tests different aspects of the theory across multiple studies using multiple techniques. These studies echo earlier research in environmental psychology and consumer behavior that has revealed that people often say one thing but do another, an important consideration for any service provider that relies on consumer research to make planning decisions.

CHAPTER ONE:
CONSUMERS' RESPONSES TO INTER-TABLE SPACING IN RESTAURANTS

Introduction

Most people think that full-service restaurants are in the business of selling food. But in reality restaurants are in the business of renting out space: when guests occupy a table, they pay rent in the form of food and drink purchases. In most restaurants, this "rent" is unrelated to how long the space is occupied. Revenue management (RM) strategies for restaurants focus on balancing length of stay with pricing so that the operator generates the highest possible revenues from each table, but current RM practice does not often take the space that each table occupies into account. In an effort to maximize capacity, many restaurant operators make what they hope is the most profitable use of dining room space by packing in as many tables as codes will allow. While this approach to increasing capacity may appear to be a valid RM strategy, a significant concern is that close table spacing may generate dissatisfaction due to overcrowding. If diners are unhappy with aggressive capacity management, the eventual loss of customers would likely reduce restaurant revenues.

This paper investigates how consumers view restaurant table spacing and examines if tight inter-table spacing influences guest attitudes and preferences. What follows is a brief review of the academic literature as it relates to personal space and privacy in public settings, accompanied by a summary of a US-based survey that sought reactions to images of restaurant tables set at different distances under three dining scenarios. The findings presented here build on what is known about proxemic

behavior in service settings and may help restaurant operators and designers create dining environments that use space well and enhance the guest experience.

Personal Space in Dining Environments

People need room around their bodies that is free from encroachment by others, particularly strangers. The result is a zone of space around the individual called personal space (Hall, 1966). Personal space is both portable and variable: the need for some kind of zone that is free from encroachment is present at all times and in all situations, but the size and shape of personal space changes with the social setting and the characteristics of other occupants. When a social occasion takes place with acquaintances, the amount of personal space required can be relatively small, but with strangers, the need for personal space increases and real discomfort occurs if someone violates that space without good reason (Hall, 1966). As well as varying by circumstance, personal space boundaries are not uniform in shape: they tend to be broader directly in front of and behind a person and narrower on either side (Hayduk, 1981), leading to increased sensitivity to encroachments from the front or rear than from the side (Kaya and Erkip, 1999).

Previous research has demonstrated that the most important reason for maintaining personal space is to avoid or manage emotional stress (Evans and Howard, 1973). Stress results when an individual has less control over a situation or environment than is desired, and continues until an appropriate level of control is regained either through action on the part of the individual or through a change in circumstance (Averill, 1973). Close proxemic behavior, defined as being within eighteen inches (45 cm) of someone else (Hall, 1966), reduces privacy and increases stress if the person nearby is

not an intimate (Altman, 1975) and the resulting discomfort can generally only be alleviated by either increasing interpersonal distance when conditions allow (Argyle and Dean, 1965) or by leaving the environment (Baum and Valins, 1977).

However, reductions in personal space do not always result in discomfort. Spatial density must be experienced as a limiting factor in order to spur feelings of crowding, and individual and situational differences moderate responses to tight interpersonal spacing. Sex, age, group size and composition, and cultural affiliation have all been shown to influence spatial preferences and behaviors although the research results vary (see Hayduk, 1983 for a detailed summary). In general, males and older people appear to prefer more interpersonal distance. Larger groups tend to command greater personal space per person than do smaller ones (Knowles et al., 1976). Interacting with friends reduces personal space needs whereas disequilibrium in status between participants in a group increases spatial boundaries (Hayduk, 1983). Cultural affiliation – which is often equated with nationality or ethnicity in observational research despite conceptual differences among these terms (Clark, 1990; Lee, 2000) -- likewise influences proxemic behaviors. Those from the collectivist cultures of Asia, the Mediterranean and Latin America often adopt closer interpersonal distances than those from individualistic cultures like North America or Northern Europe (Hall, 1966; Evans et al., 2000).

Situational context profoundly affects privacy needs. Potentially stressful situations such as dining by oneself in public or being interviewed during a meal require greater privacy (Barash, 1972; Robson, 2008), and even the size of the environment can influence how closely individuals will sit: the larger the space, the closer its occupants will typically gather (Sommer, 1965). Familiarity with high-density situations, either

from past experience or from descriptive information received ahead of time, may affect reactions to reduced personal space (Baum, Fisher, and Solomon, 1981). Those who live in crowded urban areas tend to be more comfortable with reduced personal space but may react more forcefully when spatial norms are not respected (Kaya and Weber, 2003).

In some conditions, reduced personal space may actually be desirable. For example, a packed arena can make a hockey game more exciting and arousing. Arousal is an important component of experience: too little or too much arousal may be aversive, but an appropriate or expected amount of arousal for any given circumstance may enhance pleasure (Schachter and Singer, 1962; Mehrabian and Russell, 1974). Arousal is defined as any response to stimuli and therefore can have positive or negative effects, while stress is generally limited to conscious or unconscious negative reactions to specific conditions. The right degree of arousal can encourage exploration, lengthen the amount of time spent in a setting and increase spending (Mehrabian and Russell, 1974; Donovan et al., 1994) and the appropriate degree of arousal in a service setting enhances satisfaction (Wirtz, Mattila, and Tan, 2000; Mattila and Wirtz, 2006).

Understanding the desired degree of arousal is key for effective restaurant design and management, but there is little research on guest preferences or behaviors regarding restaurant seating. Guests appear to prefer restaurants that have other patrons present but not in such number or proximity that conversations cannot be conducted easily or that personal boundaries are violated (Tse, Sin, and Yim, 2002; Andersson and Mossberg, 2004). Customers prefer tables that offer the most control over personal space, generally through the provision of some kind of physical feature that separates tables from others (Robson, 2008). When dining with friends and family, consumers

tend to choose tables next to a window while tables in a corner are strongly preferred when the occasion is more formal. This desire for more personal space may explain the popularity of booth seating in many restaurants; booths provide multiple physical boundaries between the occupant and those nearby, offering a clearly demarcated territory which is easier to defend from spatial intrusion and makes crowded conditions more tolerable (Sommer, 1959; Desor, 1972; Dale, 2002).

Research Question

While it is clear that diners want adequate personal space, what is "adequate" in this context has not been clearly established. The literature provides ample support for the assertion that feelings of stress stem from reduced privacy and a lack of perceived control (Altman, 1975; Hui and Bateson, 1991) and that a moderate amount of arousal contributes to positive experiences (Mehrabian and Russell, 1974). However, how inter-table distance affects stress, arousal, perceived control or comfort is not well understood.

Most proxemic research that examines seating preferences and behaviors looks at the distance between individual chairs or the relative position of seats around a single table rather than the distance between tables (Sommer, 1967; Sommer, 1969; Mehrabian and Diamond, 1971; Patterson et al., 1979; Pedersen, 1994). The study presented here gives insights into how guests perceive specific inter-table distances during projected dining occasions and how those perceptions translate into attitudes and preferences. This work offers a practical contribution to the revenue management literature by providing empirical evidence for the importance of space as a component of capacity, and expands the understanding of seating behavior by examining multiple

table environments which have received little attention from environmental psychologists. Further, the intention is to provide the restaurant industry with guidance regarding appropriate inter-table distances for full-service dining operations by addressing how consumers respond to restaurant table spacing.

If having less personal space reduces a guest's ability to control privacy, then it is possible that diners may adopt what Mehrabian and Russell (1974) call "avoidance" behaviors: premature departure, reduced spending, and negative affect. Earlier research has shown that table types that offer guests reduced psychological comfort appear to reduce dining duration (Kimes and Robson, 2004), and it may be that shorter stays will occur when guests are seated in close proximity to adjacent tables. Effective restaurant revenue management strategy includes controlling how long guests occupy their tables but reduced duration is not a viable approach to managing capacity if a faster dining time is accompanied by guest discomfort. Tightly packed seating may also have a negative effect on average check because uncomfortable guests may be less inclined to order additional courses or a second glass of wine. Lastly, unhappy guests are unlikely to return and more likely to spread negative word-of-mouth (Richins, 1983), and thus table spacing's effect on dining satisfaction is an important consideration during design as well as once a restaurant is operational.

Methodology

For this study, a two-part web-based questionnaire was used to elicit guest responses to images of restaurant tables at varying inter-table distances. The first part of the survey asked respondents to report their gender, age, ethnicity, place of residence (urban, suburban, rural), restaurant use frequency, and whether they had work

experience in the restaurant industry. These last three variables were selected to help identify respondents who may be more familiar with close inter-table distances. Gender, age and ethnicity were solicited to help evaluate whether these common moderators of proxemic behavior influenced restaurant table preferences. Ethnicity was included in the survey as a proxy for cultural affiliation, as most individuals are able to report ethnic background accurately but may not be able to clearly articulate the culture with which they most closely identify. No information was collected about country of birth or citizenship.

The second part of the survey measured emotional, intentional and anticipated behavioral reactions to one of three images of a table for two placed at a distance of 6, 12 or 24 inches away from other identical tables under one of three different dining scenarios: dining for business purposes ("Business"), dining with a friend ("Friend"), and dining while on a date ("Romantic"). These three scenarios were selected to represent realistic dining occasions and also to vary the level of stress suggested by the scenarios because stressful circumstances have been demonstrated to influence restaurant table choice (Robson, 2008). The three distances selected were derived from Hall's work on preferred interpersonal distances for intimates and acquaintances (Hall 1966), and from a review of floor plans of recently constructed restaurants in hospitality design publications. Photographs were taken showing a typical restaurant banquette with empty tables spaced at one of the three selected distances (Figure 1.1).

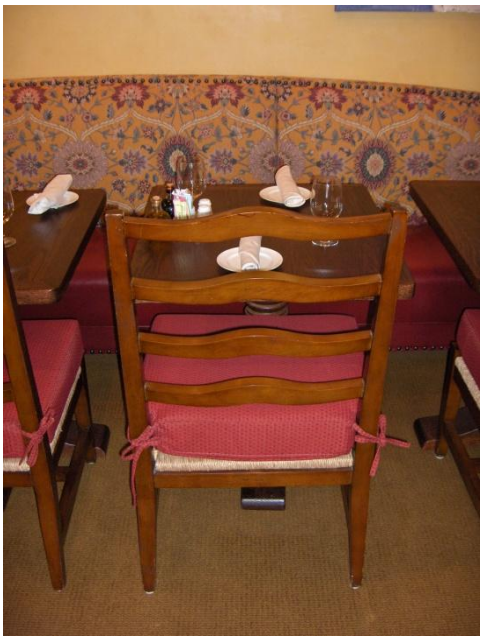

Figure 1.1. Example of visual prompt (6 inch inter-table spacing shown).

Respondents were randomly assigned to one of nine combinations of scenarios and images and asked to respond to a series of thirty-two statements that solicited their emotional and behavioral responses to specific inter-table spacing. Responses to each statement were measured on a standard Likert-type scale (1=Strongly Disagree, 7 = Strongly Agree). Twelve statements related to emotional responses and were selected from the Stress Arousal Check List (SACL), a survey instrument demonstrated to accurately reflect respondent stress and arousal and to clearly differentiate between these constructs (King, Burrows, and Stanley, 1983). An additional four survey items were newly created for this study to address the amount of perceived control and comfort elicited in each seating condition. A further sixteen items were designed to measure behavioral and intentional responses to the seating. The survey also included a single measure of perceived crowding to serve as a manipulation check.

All survey items were pre-tested using a convenience sample to check for validity and reliability. Ten individuals of varying ages, ethnicities and locations were asked to distribute a link to the web-based pilot survey to their own contacts via email, resulting in a sample of 282 valid responses. Exploratory factor analysis using principal components extraction and varimax rotation resulted in a reduction in the number of seating response items in the survey from sixteen to eight (Table 1.1) but all other items were retained.

Table 1.1. Factor Analysis of Retained Pre-Test Survey Items

	Component	
	1	**2**
Sitting at this table, I would feel like the restaurant cares about me	0.826	-0.153
Sitting at this table, I would have the kind of experience I want	0.754	-0.206
Sitting at this table, I would have an exciting meal experience	0.725	-0.166
Sitting at this table, I would feel like a VIP	0.672	-0.060
Sitting at this table, I would disturb the next table if I had to get up	0.024	0.751
Sitting at this table, I would be overheard by other diners	-0.105	0.726
Sitting at this table, I would feel like I was being watched	-0.307	0.695
Sitting at this table, I would feel exposed	-0.422	0.630
Inter-item Reliability (Cronbach's alpha)	*0.762*	*0.700*

Responses to the emotional items from the SACL were combined based on King, Burrows and Stanley's scoring to create summary scores for the constructs of stress and arousal, and the remaining responses were combined to form summary scores for perceptions of control and comfort (Table 1.2). These summary scores provided a way to differentiate between the four major constructs being studied and simplified further analysis.

Table 1.2. Emotional Variable Groupings for Summary Scores

Stress	Arousal	Control	Comfort
+ Tense	+ Lively	+ In Control	+ Comfortable
+ Distressed	+ Active	+ Influential	- Crowded
+ Uptight	+ Vigorous		
+ Worried	- Passive		
+ Bothered			

The finalized survey was distributed via a web link to a diverse national sample obtained from a professional sampling company. Once slightly more than one thousand valid responses were received, online access to the survey was closed.

Results

There were 1,013 valid responses to the survey. Sample sizes in each category are summarized in Table 1.3. The sample was well balanced by gender and relatively well balanced by residence, but had notable imbalances across age groups and ethnicities as well as in dining frequency. About one third of the sample had worked

in a restaurant at some time, which is slightly lower than the national average (National Restaurant Association, 2010).

Table 1.3. Demographics of Survey Respondents

Gender	**n**	**%**
Male	461	45.5%
Female	537	53.0%
No Response	15	1.5%
Age	**n**	**%**
Under 21	62	6.1%
21-35	234	23.1%
36-50	319	31.5%
Over 50	391	38.6%
No Response	7	0.7%
Ethnicity	**n**	**%**
White	821	81.1%
Black	74	7.3%
Hispanic (any race)	44	4.3%
Asian	33	3.3%
Other	37	3.7%
No Response	4	0.4%
Residence	**n**	**%**
Major city	182	18.0%
Smaller city	257	25.4%

Table 1.3 (Continued)

Suburban area	340	33.6%
Rural Area	230	22.7%
No Response	4	0.4%
Dining Frequency	**n**	**%**
More than three times per week	63	6.2%
One to two times per week	198	19.5%
One to two times per month	340	33.6%
Less than one time per month	319	31.5%
Don't Know/No Response	93	9.2%
Experience in Restaurants	**n**	**%**
Yes	392	38.7%
No	618	61.0%
No Response	3	0.3%

Random assignment of respondents to table spacing distances and scenarios resulted in generally well-balanced samples of at least 90 valid responses for each of the nine Spacing x Scenario conditions tested (Table 1.4).

Table 1.4. Sample Sizes by Scenario and Table Spacing

Scenario	**6"**	**12"**	**24"**	**Total**
Business	127	106	114	347
Friend	108	102	123	333
Romantic	93	117	123	333

Confirmatory factor analysis on the reaction and emotional scales using principal component extraction and varimax rotation showed that all variables loaded as expected and had acceptable reliability results as summarized in Table 1.5. The reaction scales loaded well on two factors which were grouped as Pleasure and Privacy. The emotional variables loaded very clearly and reliably into stress and arousal factors, providing further evidence of the efficacy of the King, Burrows and Stanley (1983) measure for distinguishing between these two types of response to environmental conditions.

Table 1.5. Confirmatory Factor Analysis of Survey Items

Reaction Items	**Component 1 (Pleasure)**	**Component 2 (Privacy)**
Exciting	**0.873**	-0.1101
Cares	**0.871**	-0.125
Experience	**0.853**	-0.124
VIP	**0.840**	-0.159
Watched	-0.127	**0.845**
Overheard	-0.115	**0.840**
Disturb	-0.123	**0.808**
Exposed	-0.116	**0.753**
Cronbach's alpha	*0.892*	*0.835*
Emotional Items	**Component 1 (Arousal)**	**Component 2 (Stress)**
Lively	**0.863**	-0.164

Table 1.5 (Continued)

Influential	**0.844**	-0.128
Active	**0.835**	-0.080
Vigorous	**0.810**	-0.024
InControl	**0.807**	-0.296
Contented	**0.758**	-0.281
Comfortable	**0.758**	-0.389
Passive	**0.564**	0.217
Tense	-0.128	**0.873**
Distressed	-0.103	**0.844**
Uptight	-0.101	**0.835**
Worried	0.006	**0.800**
Bothered	-0.256	**0.788**
Crowded	-0.138	**0.771**
Cronbach's alpha	*0.913*	*0.908*

Figures 1.2 through 1.7 summarize the survey results by inter-table distance. For all of the pleasure, stress, control and comfort variables and for all but one of the privacy variables, there was a statistically significant difference between responses to tables set 6 inches apart when compared with those at 12 inches or 24 inches, and means varied in the expected directions. (None of the arousal variables was significantly different across the difference inter-table distances.) Close table spacing made respondents feel less private, more crowded, less likely to have a positive meal experience and more dissatisfied with the table to which they were assigned. Further, patrons presented with tables spaced 6 inches apart were more concerned with

disturbing others or being overheard by others during the meal (Figure 1.3). (For all results in all chapters: * = *p<.05; ** = p<.01; *** = p<.001*).

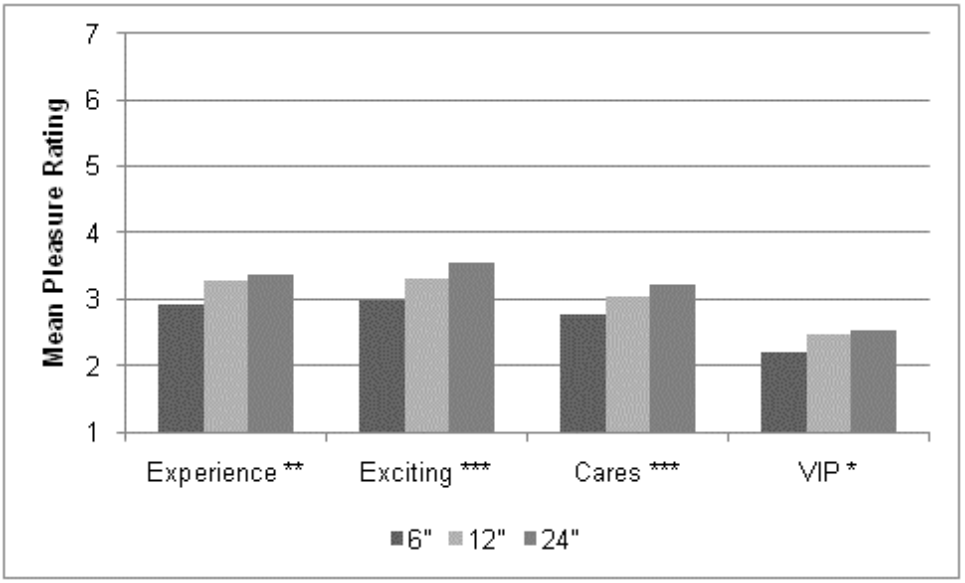

Figure 1.2. Comparison of survey items by table spacing: Pleasure.

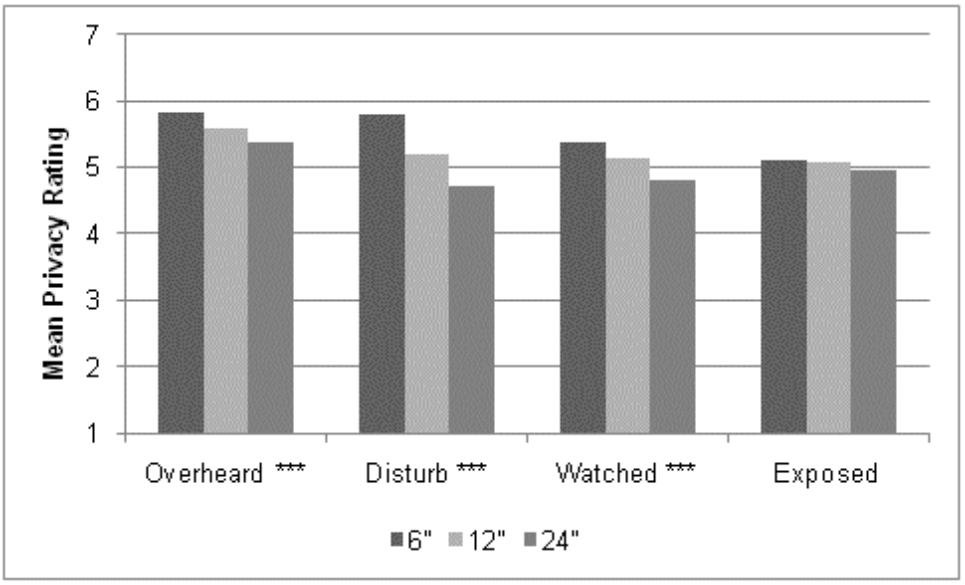

Figure 1.3. Comparison of survey items by table spacing: Privacy.

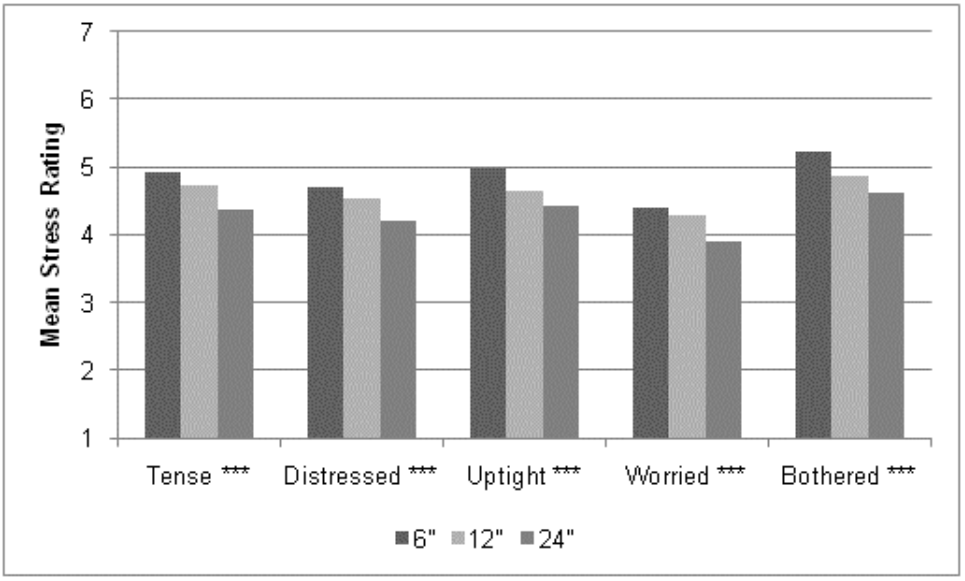

Figure 1.4. Comparison of survey items by table spacing: Seating Preferences.

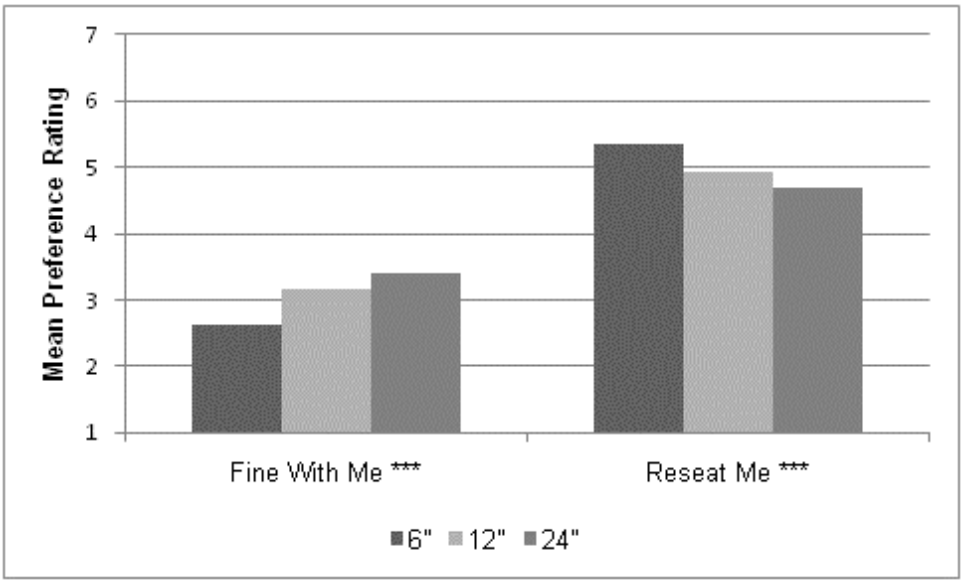

Figure 1.5. Comparison of survey items by table spacing: Stress.

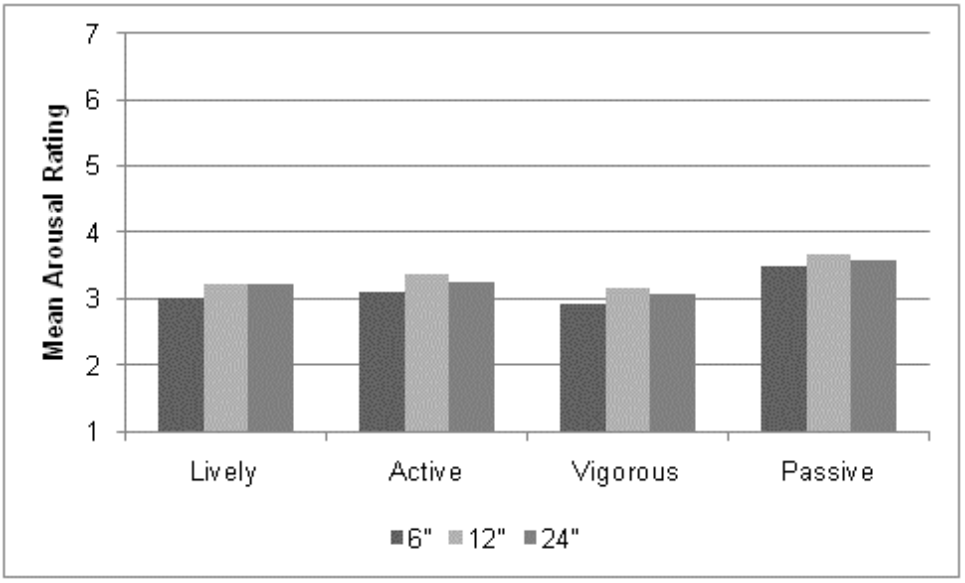

Figure 1.6. Comparison of survey items by table spacing: Arousal.

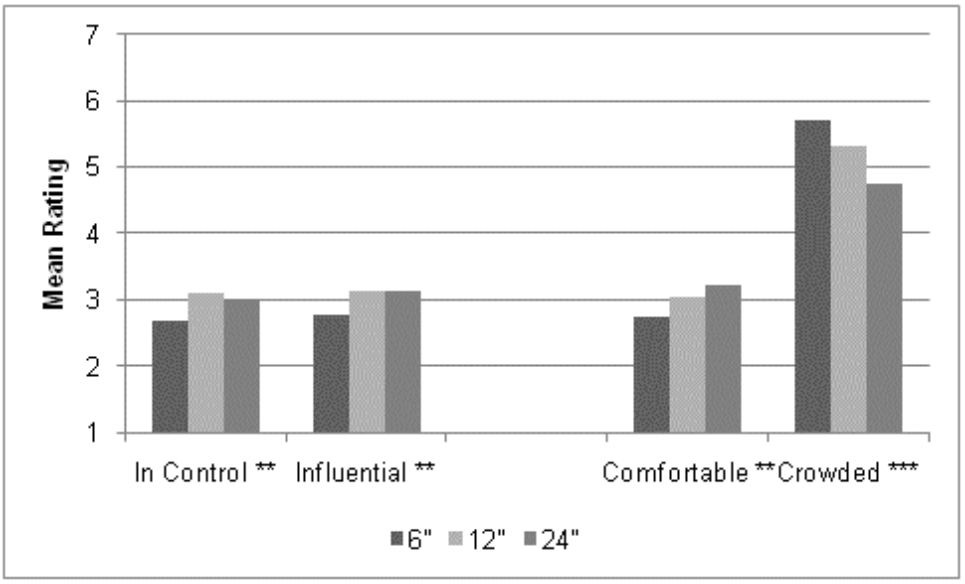

Figure 1.7. Comparison of survey items by table spacing: Control and Comfort.

Stress responses (Figure 1.5) varied significantly by table distance *(F=11.994, df=2, p<.000)*. Tables that were pictured at 6 inches apart rendered a mean stress score of 24.12, whereas tables pictured at 12 inches (mean stress = 23.06) and 24 inches (mean stress = 21.46) resulted in progressively lower mean stress scores. Arousal scores (Figure 1.6) were not significantly different across table spacing conditions at the .05 level *(F=2.842, df=2, p=.059)*, but feelings of control *(F=7.483, df=2, p=.001)* and comfort *(F=18.031, df=2, p<.000)* were markedly lower in the close table spacing condition than they were at wider spacing (Figure 1.7).

The correlations among the four emotional summary scores conformed to the theoretical relationships between stress, arousal, control and comfort (Table 1.6). Stress scores were negatively correlated with arousal scores and with feelings of control and comfort. The strong positive correlations among arousal, comfort and control provide further evidence that stress and arousal are distinct constructs and that moderate levels of arousal may be positive to the guest.

Table 1.6. Correlations Among Summary Scores

	Stress	**Arousal**	**Control**	**Comfort**
Stress	1.000	-.239(**)	-.341(**)	-.630(**)
Arousal		1.000	.787(**)	.627(**)
Control			1.000	.730(**)
Comfort				1.000

The dining scenario appeared to be important when assessing satisfaction with a given inter-table distance (Figures 1.8 through 1.11). This effect was most pronounced for the romantic scenario: respondents asked to envision being on a date were strongly negative when presented with close adjacent tables, expressing significantly more stress *(F=8.278, df=4, p<.000)*, less control *(F=4.587, df=4, p=.011)* and more discomfort *(F=14.713, df=4, p<.000)* at the 6 inch distance when compared with the 12 inch and 24 inch spacing. Dining while on business did not appear to affect responses to tight table spacing except in terms of comfort *(F=3.629, df=4, p=.028)*, whereas dining with a friend prompted modest stress *(F=3.817, df=4, p=.023)* and discomfort *(F=3.991, df=4, p=.019)* at reduced inter-table spacing but had no significant effect on arousal or perceived control.

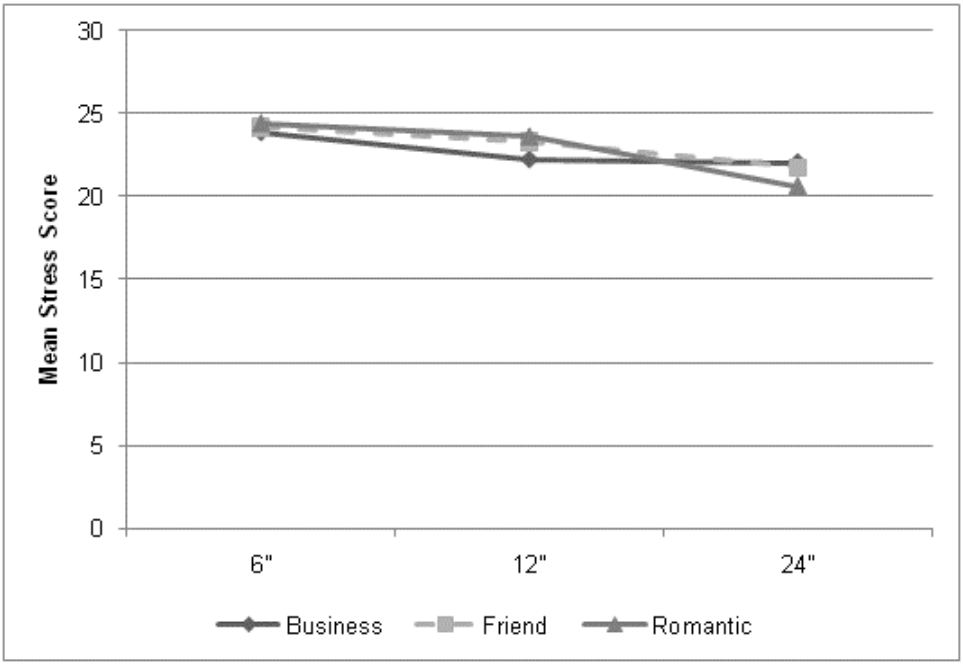

Figure 1.8. Stress responses by table spacing and scenario.

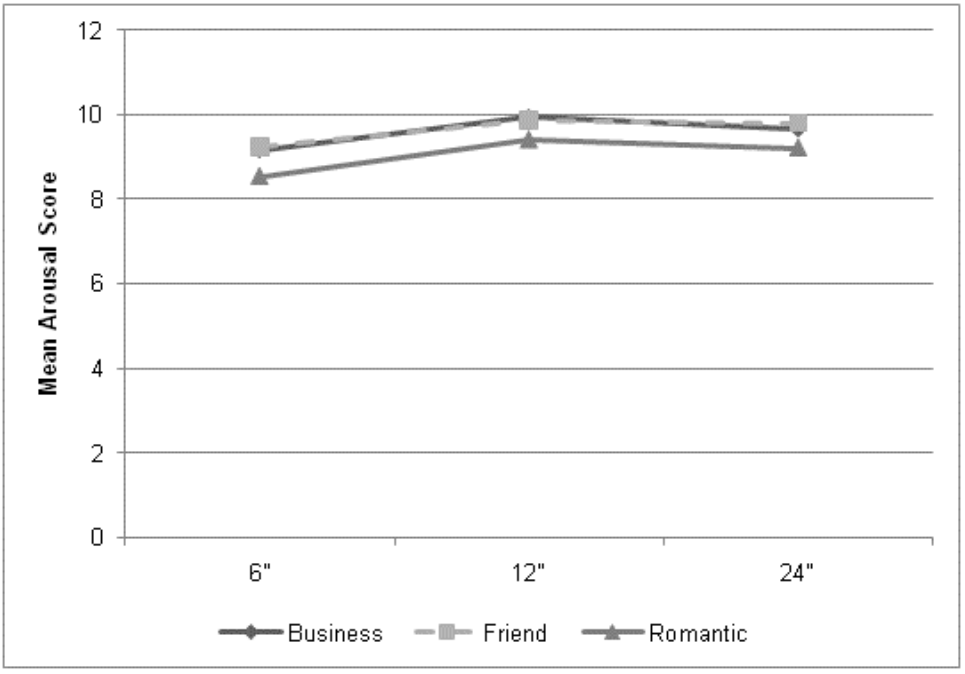

Figure 1.9. Arousal responses by table spacing and scenario.

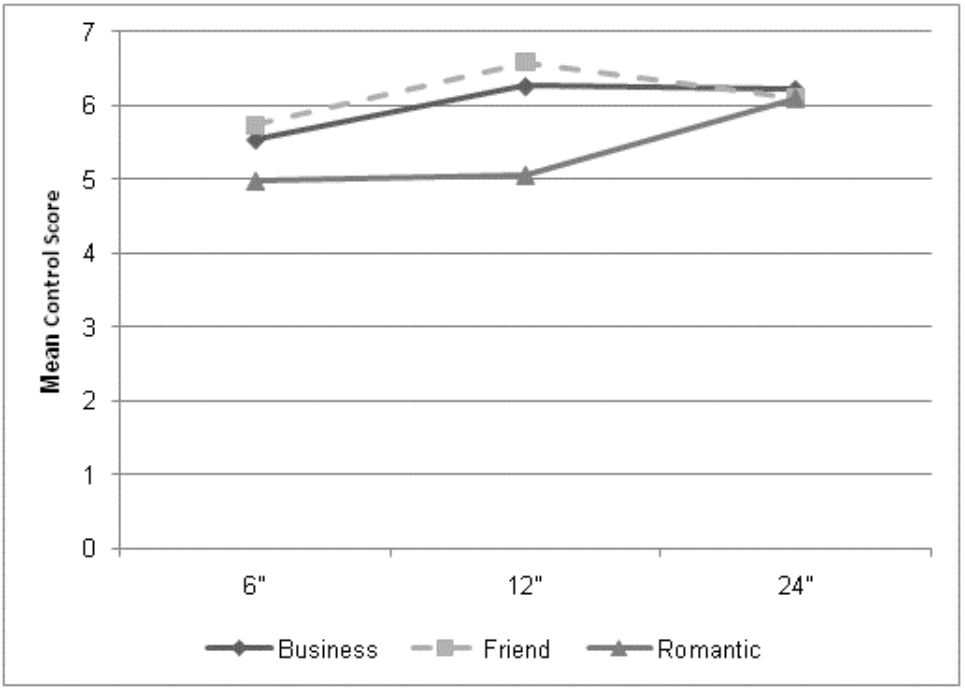

Figure 1.10. Control ratings by table spacing and scenario.

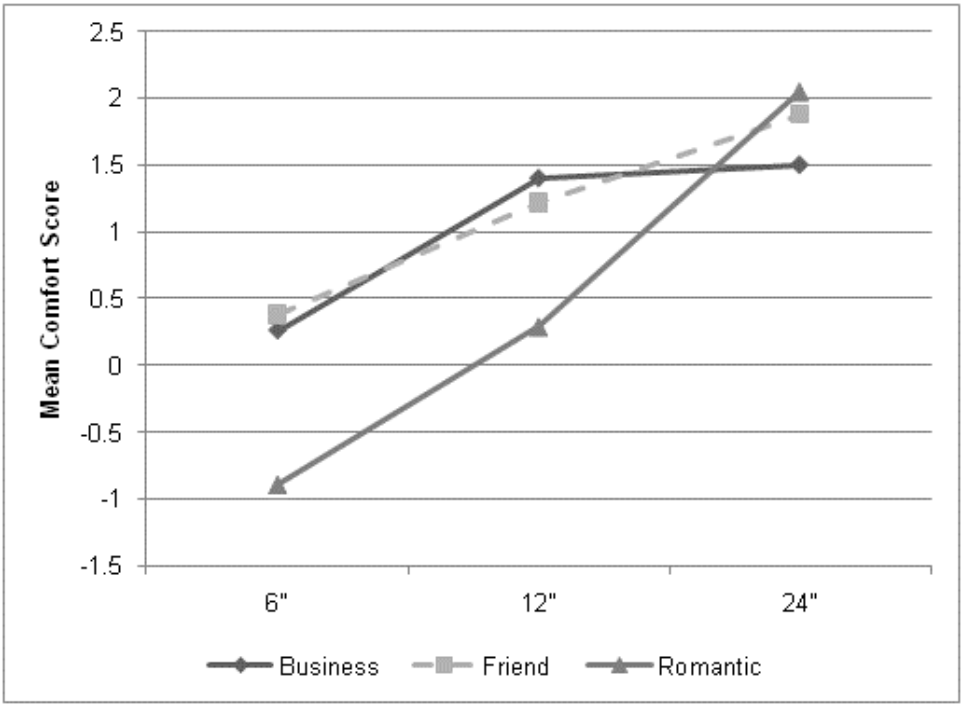

Figure 1.11. Comfort ratings by table spacing and scenario.

Stress, arousal, control and comfort were all moderated by gender (Table 1.7). In general, women expressed significantly more stress *(t=-4.024, p<.000)*, less control *(t=4.564, p<.000)* and greater discomfort *(t=5.292, p<.000)* than men, while men felt more arousal *(t=3.078, p<.002)* than women at each distance. Even at the relatively generous 24 inch spacing, women were significantly more uncomfortable than men in every scenario. There were no significant interactions between gender and table spacing.

Table 1.7. Gender Comparisons in Mean Scores by Inter-Table Spacing

Spacing	Gender	Stress	Arousal	Control	Comfort
6"	Male	22.80	9.46	6.02	0.89
	Female	25.37**	8.59	4.89**	-0.88***
12"	Male	21.86	10.30	6.63	1.65
	Female	24.45**	6.63*	5.81*	0.22**
24"	Male	20.99	9.79	6.47	2.44
	Female	21.93	9.39	5.80*	1.29**

Degrees of stress, arousal, control and comfort varied significantly but not consistently by age group across each of the three distances tested (Table 1.8). (Because the number of respondents under 21 was substantially lower than that of the other three age groups tested, this younger group was excluded from any age analyses.) Stress levels were not significantly different by age group except at the 24 inch spacing, where younger patrons expressed slightly higher stress levels *(F=2.716, df=2, p=.045)*. Younger respondents were more aroused at the 12 inch distance than other age groups *(F=6.065, df=2, p=.001)* and also appeared to feel more in control *(F=5.700, df=2, p=.001)* and marginally more comfortable *(F=3.172, df=2, p=.025)* at the 6 inch spacing than did those over 35. Surprisingly, all age groups felt more in control at the 12 inch distance than at the 6 inch or 24 inch spacing. In terms of comfort, older respondents expressed diminished comfort as table spacing decreased, with respondents over 50 indicating the greatest degree of discomfort at the 6 inch distance and the highest degree of comfort with tables set 24 inches apart. There were no significant interactions between age and spacing.

Table 1.8. Age Comparisons in Mean Scores by Inter-Table Spacing

Spacing	Age Group	Stress	Arousal	Control	Comfort
6"	22-35	24.26	9.86	6.49**	1.01*
	36-50	24.65	9.36	5.64	-0.13
	Over 50	24.41	8.37	4.78	-0.69
12"	22-35	22.47	10.49**	6.99	1.73***
	36-50	23.83	9.93	9.93***	0.74
	Over 50	23.02	8.64	8.64	0.15
24"	22-35	22.56*	10.20	6.57	1.69
	36-50	20.42	9.75	6.18	1.97
	Over 50	21.17	9.10	5.88	2.05
Spacing x Age F-Test		1.558	.283	1.178	2.116

The heavy imbalance in sample sizes for the five ethnic groups tested suggested that ANOVA based on Type II sums of squares would be appropriate for determining whether differences between these groups were significant (Langsrud, 2003). Stress and arousal scores were similar for all groups at each distance but ratings of control *(F=2.979, df=4, p=.018)* and comfort *(F=3.058, df=4, p=.016)* varied by ethnic background: at 6 inches and 24 inches, respondents of Asian heritage felt more in control and more comfortable than other groups, whereas at 12 inches, Hispanic respondents expressed greater comfort and control. There were no other statistically

significant differences across ethnic groups and ethnicity did not interact significantly with spacing.

Where respondents lived did not affect stress *(F=1.045, df=4, p=.372)*, control *(F=2.187, df=4, p=.088)* or comfort *(F=.948, df=4, p=.417)* significantly, but did influence arousal *(F=3.791, df=4, p=.010)*. Residents of large cities indicated slightly higher arousal than suburban, small town, or rural respondents at all distances but these differences were not statistically significant. Frequent diners expressed a higher degree of comfort at all table spacing distances when compared with those who dine out less frequently *(F=3.410, df=4, p=.009)* but this was the only statistically significant difference observed among all diners. Prior work experience in the restaurant industry did not have a significant effect on any measure at any distance.

These results clearly indicate that potential restaurant guests feel very strongly negative toward tables spaced as tightly as 6 inches apart, and that even the more common spacing of 12 inches is considerably less desirable than generously spaced tables.

Managerial Implications and Further Research

Consumers are very clear in their dislike of closely spaced restaurant tables. When presented with images of dining tables spaced 6 inches apart, survey respondents consistently indicated that they felt uncomfortable, crowded, and generally negative toward the restaurant. Fully 70% of those surveyed indicated that they would be asked to be reseated if a restaurant host were to show them to a table spaced so closely to its neighbors. When tables were spaced at 12 inches -- an inter-table distance that is not

unusual in many full-service restaurants -- negative responses still dominated almost every question tested. Even at a very spacious 24 inches apart, tables were seen as crowded and uncomfortable by 35% of respondents. These negative reactions were similar across all dining scenarios but were most pronounced when respondents were asked to imagine they were on a romantic date.

Consistent with much of the literature on proxemic behavior, females were significantly more agitated by close table spacing, finding it to be more stressful, less comfortable, and more constraining than did males. Men expressed more arousal at each of the inter-table distances but only significantly more arousal than women in the case of tables spaced 12 inches apart. Likewise, older respondents were markedly less comfortable at closer distances. Although other researchers have found significant differences in responses to crowded conditions across different ethnicities (Kaya and Weber, 2003; Kim, Wen and Doh, 2010), in this study there were only minimal differences in perceived control or comfort between white and Asian respondents and no significant difference in stress or arousal responses at all among white, black, Asian, or Hispanic groups. Because birthplace and citizenship were not identified in this study, it is not possible to determine whether the Asian respondents were actually Asian-American and thus likely to respond with North American cultural norms rather than the higher context behaviors and attitudes common to Asian cultures.

It was thought that respondents who were more likely to be familiar with smaller inter-table distances – those who live in expensive cities, who dine out often, or who have worked in the restaurant industry – would be more accepting of tightly spaced tables, but this was not the case. Whether respondents lived in large urban areas, suburbs, small towns or rural areas did not substantially affect their feelings about tight table

spacing: large city dwellers indicated increased arousal at tighter distances but were equally as likely to dislike close tables. Those that dine out frequently tended to be more comfortable at closer distances but still felt stress and a lack of control when tables were only 6 inches or 12 inches apart. Respondents' past experience working in restaurants had no effect on any responses in our survey.

The findings of this study present a challenge for restaurant operators and designers. Whereas current restaurant design practice routinely positions parallel tables along banquettes at approximately 12 inches apart (and even closer in expensive urban settings), it is clear that guests have a very negative view of such spacing. Further research is needed to identify the optimal table spacing for creating satisfied guests while still maximizing the use of dining space. It is highly likely that the context of the dining experience and the psychographics of the target market will both moderate preferred inter-table distances, but from these findings one can make a safe assumption that putting restaurant tables less than 12 inches apart is inadvisable if the operator hopes to please most guests.

While this study's findings were very clear, one concern is the self-selecting nature of the respondents. As is the case with most consumer surveys, responses were voluntary and anonymous with no way to confirm the veracity of demographic responses. There is also no data on the number of prospective respondents contacted for the web survey so a response rate cannot be gauged.

This study initiates a broader program of research into the most effective table spacing and table configurations for maximizing both guest satisfaction and dining room capacity. This course of research is intended to compile new evidence for proxemic

preferences and behaviors in real service environments and provide the restaurant industry with guidance for effective table spacing.

CHAPTER TWO:

STRESS AND AROUSAL IN DENSE TABLE CONDITIONS

Introduction

Allocating space, particularly when it is a scarce or expensive resource, requires finding a balance between efficiency and comfort. Insufficient personal space has been shown to result in negative outcomes when people have long-term exposure to crowding but very little research has been conducted on the impact of short exposures to dense conditions. Many environments such as libraries, waiting rooms, and public transit have seating that may be used only a short period of time but are expensive to create, and therefore need to be designed to be economical in their use of space while still providing high levels of user comfort. Individual seating of this type has been well studied but there is little known beyond the anecdotal about how users respond to seating at tightly-packed tables such as those adopted by restaurants. This study examines emotional and behavioral responses to reduced personal space in short-term table seating conditions in an effort to uncover whether such conditions result in negative affect.

Dense seating conditions are not the same as crowded conditions. Density is an objective allocation of space whereas crowding is a subjective experience, influenced by social, situational, and personal factors (Stokols, 1972). Typically, there must be dense conditions in order for crowding to be felt, but reduced personal space does not always translate into perceptions of crowding (Webb & Worchel, 1993). Density in and of itself may not be detrimental, but crowding has been shown to create stress due to reductions in privacy (Sundstrom, 1975).

Most research examining perceptions of crowding and stress have focused on the lone individual in conditions of varying spatial density (e.g. Saegert, Mackintosh & West, 1975; Middlemist, Knowles & Matter, 1976; Kaya & Erkip, 1999; Evans & Wener, 2007), but there is little work examining how tight spacing influences individuals that are part of an interacting dyad when other interacting parties are in close proximity. Knowing more about how people respond to crowded seating while interacting with others has implications for effectively allocating space in restaurants, study lounges and other collaborative settings without inducing stress or discomfort in users.

Stress, Privacy and Perceived Control

Stress occurs when there is an imbalance between the experienced state and the desired state, such as the discomfort which stems from a perceived lack of privacy. The construct of privacy implies that there is a zone of personal space that is protected from physical, auditory or visual intrusion by others and that varies in size and shape in different contexts (Hall, 1966; Knowles, 1980; Worchel, 1986). Violations of this personal space are often experienced as stressful.

Researchers who examine stress in response to reduced privacy have proposed a number of theoretical causes for this discomfort: external constraints on behavioral choice (Proshansky, Ittelson & Rivlin, 1970; Stokols, 1972; Sundstrom, 1975); overstimulation (Evans, 1979; Wohlwill, 1974); or a lack of behavioral control (Altman, 1975; Schmidt & Keating, 1979). In the behavioral choice model, privacy represents the freedom to choose the level of access to the self, and therefore invasions of privacy occur in those circumstances which remove some or all of our ability to choose our behaviors for ourselves. The primary argument for the overstimulation

model is that invasions of privacy increase arousal levels by placing an overload on our sensory or other cognitive systems (Glass & Singer, 1972; Evans, 1978). The most prevalent model of privacy is that of behavioral control, which holds that encroachments by others reduce perceived control. This privacy invasion is a form of goal-blocking, a reduction in behavioral control that is typically stressful (Sundstrom, 1975). Sundstrom also posits that spatial intrusion generates feelings of reduced personal control even if the intrusion does not prevent individuals from achieving specific goals.

There is ample evidence that reduced personal space can induce negative responses (Kutner, 1973; Sundstrom & Altman, 1976; Aiello et al, 1977). However, in situations where reduced personal space does not interfere with perceived control, a negative emotional response is much less likely to occur (Schmidt & Keating, 1979). As long as individuals perceive that they have some control over their experience or that they can predict the occurrence and intensity of a stressor, they are likely to experience reduced stress (Geer, Davidson & Gatchel, 1970; Geer & Maisel, 1972; Cohen 1980; Hui & Bateson, 1991). Perceptions of crowding also appear to be diminished when groups interact rather than individuals (Baum et al, 1979). This effect may be due to distraction or to feelings of greater control (Goffman, 1963).

Behavioral and Emotional Responses to Reduced Personal Space

Perceived crowding can create physiological and psychological stress (Middlemist, Knowles & Matter, 1976; Evans & Wener, 2007). If we cannot regain some sense of comfort by creating more personal space, we will adopt a number of aversive behaviors such as changing the lean or orientation of the torso, averting our eyes, or

pulling in our extremities to reduce the potential for physical contact (Argyle & Dean, 1965; Cappella, 1981; Evans & Wener, 2007). These behaviors are well-documented in observational studies under a variety of conditions and contexts, as are responses to stress from crowding that are less obvious to an observer, such as reduced liking for those nearby (Sundstrom, 1975; Dooley, 1978). Other negative responses to spatial invasion may include withdrawal, insensitivity to others, reduced helping, and aggressive behaviors (Mehrabian & Russell, 1974; Cohen, 1980; Berkowitz, 1989; Felson, 1992).

Persons experiencing stress from reduced personal space have in some cases shown performance deficits across complex tasks (Glass & Singer, 1972; Cohen, 1980). Sherrod (1974) showed that those working in a high density environment had less tolerance for frustration but performed similarly to those in less crowded conditions, a finding echoed by Evans (1979) and Nicosia, Hyman, Karlan, Epstein and Aiello (1979). Maher and von Hippel (2005) found that satisfaction and performance on complex tasks are reduced for those employees with low perceived privacy. However, there are conflicting findings regarding the effect of high density on task performance: some researchers have identified negative effects (Nagar & Pandey, 1987) while some have found no effects at all (Freedman, Klevansky & Ehrlich, 1971).

Some hypothesize that crowding puts demands on our attention because we feel compelled to monitor the encroaching stimuli and it is possible that this increased cognitive load induces stress responses (Kutner, 1973; Sundstrom, 1975). While crowding does appear to reduce cognitive efficiency, coping mechanisms such as increased focus on tasks may be adopted to compensate. This would explain why performance is not always affected by crowded conditions (Langer & Saegert, 1977).

Many studies that test performance in response to a stressor measured performance after the stressor was withdrawn whereas others have tested performance while the stressor was in place, a factor possibly contributing to the inconsistent findings connecting stress responses and performance (Glass & Singer, 1972; Sherrod, 1974; Nicosia et al., 1979).

Moderating Factors

Personal space requirements and perceptions of crowding appear to be context-specific: what may be considered too close while standing in line at an automated teller may be in fact completely acceptable when standing at a roadside watching a parade (Knowles, 1980; Kaya & Erkip, 1999). The gender and relative status of others present also affect spatial preferences. Females have smaller zones of personal space and hence can tolerate closer interpersonal contacts than males, particularly when approached by someone of the same gender (Horowitz, Duff & Stratton, 1964; Patterson, Mullens & Romano, 197; Fisher & Byrne, 1975). Males adopt more personal space when approached from the front by a stranger, while females prefer to position themselves adjacent to liked others but will tolerate closer face-to-face spacing with a stranger than will males (Horowitz et al., 1964; Burgoon, 1978;). While both genders dislike being crowded, it is unclear whether males experience the same degree of stress as females under the same circumstances (Epstein & Karlin, 1975; Saegert et al., 1975). A further moderator of responses to personal space is ethnicity or cultural affiliation. Much work has been done examining the differences in preferred interpersonal distances among various ethnicities, with those from what are termed high-context cultures (Asian, Arabic and Latin cultures in particular) tending

to be more comfortable with reduced personal space than those from low-context cultures such as North American and Northern Europe (Hall, 1966; 1976).

Finally, personal space needs are reduced when we interact with those we know (Sommer, 1962; Goffman, 1963; Hall, 1966). Most crowding research has examined the proxemic behaviors of individuals when confronted with intrusions by unknown others (e.g. Middlemist, Knowles and Matter, 1976) or during staged or projected interactions (e.g. Sommer, 1962; Gifford, 1982; Worchel, 198; McKay, Pickens & Stewart, 1996). There appears to be little work on how crowding affects pairs of interactants in terms of reduced task performance or other stress responses, whether those individuals know each other or not.

This study begins to explore whether manipulating the amount of personal space allocated to a pair working collaboratively results in stress as evidenced by emotions and task performance or in perceptions of crowding. Unlike earlier studies (Sundstrom, 1975; Worchel & Teddlie, 1976; Worchel, 1986), this work holds the room size constant while varying the distance between pairs of interactants seated at individual tables. The results of this work help advance our understanding of the interaction between reduced personal space and stress and could be of significant import for designers and operators of any kind of setting where people interact in close quarters.

Research Questions and Design

In many settings, it is common practice to place parties as close together as is practical in order to maximize the utilization of space. However, spacing that is too close may

generate a stress response from users that could have negative implications for performance, satisfaction and/or well-being. In the first study outlined in the previous chapter, it was clear that closely spaced tables were seen by consumers to reduce perceived control over the dining experience. If crowded conditions truly do limit perceived control over access to the self, then stress is more likely to occur and performance decrements are more likely to be seen. Further, in settings where multiple groups are interacting concurrently, spatial and/or auditory intrusions from adjacent groups may hamper performance. The more crowded the conditions become, the more performance may be affected. This study attempts to shed light on the boundary conditions for crowding among interacting parties, information that will be helpful not only to further our knowledge of stress responses to environmental conditions but also to guide design professionals who create settings where interaction takes place in close quarters. Our specific hypotheses were:

H_1: Members of interacting dyads will demonstrate higher degrees of stress when seated in close proximity to other interacting dyads than when seated further away.

H_2: Members of interacting dyads will demonstrate higher degrees of arousal when seated in close proximity to other interacting dyads than when seated further away.

Stress and arousal appear to be related constructs but are not the same (King, Burrows & Stanley, 1983). While both are physiological responses to stimuli that may or may not be consciously perceived, arousal has been described as "how ready [a person] is to react" (Berlyne, 1960) whereas stress is often associated with strain or tension.

Arousal can be viewed as positive in that it can lead to engagement and excitement when it is not excessive (Mehrabian & Russell, 1974), while stress is more often considered to be solely negative. Arousal levels that match an individual's expectations and desires may result in positive economic outcomes for businesses (Wirtz, Mattila & Tan, 2000), so understanding factors that contribute to arousal as opposed to stress are important considerations for those creating commercial environments.

H_3: Members of interacting dyads will express greater perceived crowding when seated in close proximity to other interacting dyads than when seated further away.

Individuals that feel crowded may experience less pleasure from their environment (Hui and Bateson, 1991), and this in turn reduces what Mehrabian and Russell (1974) describe as approach behaviors: entering, exploring, or extending duration in an environment. If secondary settings such as restaurants hope to make the most positive impression on their users in order to encourage repeat business and positive word of mouth, avoiding conditions that create feelings of being crowded should be desirable. Even in settings such as bars and sports stadiums where dense conditions may contribute positively to the user experience, understanding how reduced interpersonal spacing interacts with other factors to create perceived crowding will prove valuable to both theory and design practice.

Two studies were conducted to test these hypotheses: a preliminary experiment that examined task performance, emotional response, and non-verbal behaviors of

interacting dyads in tight seating conditions, and a confirmatory study that broadened the participant demographics while adjusting some of the tasks performed.

Research setting. These studies were conducted in a controlled environment to reduce potentially confounding effects. In an effort to increase the ecological validity of this work, the experiments took place in a portion of the seating area of a student café in a university building in the northeastern United States during hours when the operation was closed. All tables in the area were 24" x 30" rectangular café tables with two movable chairs. The area selected had full height walls on three sides, and no windows. Figure 2.1 shows a floor plan of the research setting.

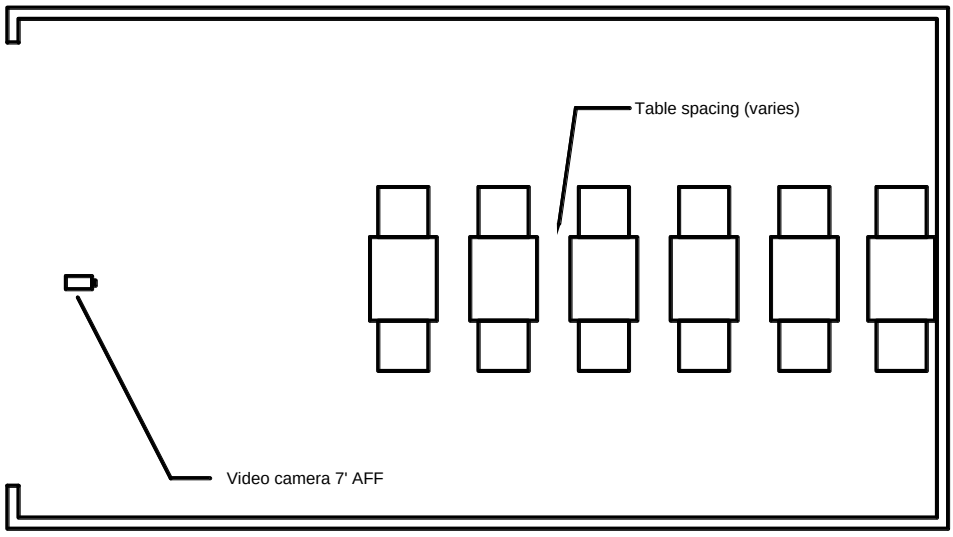

Figure 2.1. Research setting floor plan.

User responses to varying table spacing were tested by arranging the tables at three different inter-table distances selected based on Hall's work on proxemics (Hall, 1966), as well as on two pilot studies performed to establish preferred table spacing

and the table spacing that is typically adopted in foodservice settings. Because gender, ethnicity and familiarity have been shown to influence personal space preferences, these attributes were identified as covariate factors to be tested using the following model:

$$y_{ijkl} = \mu + \alpha_i + \beta_j + \gamma_k + \delta_l + \alpha_i\beta_j + \alpha_i\gamma_k + \alpha_i\delta_l + \beta_j\gamma_k + \beta_j\delta_l + \gamma_k\delta_l + \alpha_i\beta_j\gamma_k + \beta_j\gamma_k\,\delta_l + \alpha_i\beta_j\gamma_k\delta_l + \varepsilon_{ijkl}$$

where:

y = response (stress, arousal, performance, and perceived crowding)

μ = mean response

α = table spacing (i = 3)

β = gender (j = 2)

γ = ethnicity (k = 6)

δ = familiarity with partner (l = 4)

ε = error

Pilot studies. While there is significant literature on interpersonal spacing during interactions and between non-interacting individuals in public spaces, there appears to be little that has been published regarding preferred spacing for individuals seated at adjacent tables. One pilot study used naïve informants to establish this preferred spacing, and another pilot reviewed current design practice to determine typical inter-table spacing in a common public setting: restaurants.

In the first pilot study, thirty-four participants were recruited from a large introductory business computing class. These participants were selected because they did not have any background in either restaurant design or environmental psychology and therefore would most likely have representative perceptions of preferred table spacing. Participants were paid $5 for their time during the study.

The first pilot study used the same student café setting. In each of three replications, half of the participants were seated at tables along a wall while the remaining half was seated at an immediately adjacent table which could be moved. Participants were randomly assigned to seats in each replication. To determine preferred table spacing, participants seated at the movable tables were asked to imagine that they were dining at a restaurant table parallel to another party and to move their tables away from the neighboring table until they felt their table was at a comfortable distance from the other party. Once the participants had moved their tables, the preferred inter-table spacing was measured from the nearest edge of the anchored table to the nearest edge of the relocated table.

The mean observed preferred spacing was 24.12 inches. Females preferred a significantly larger inter-table distance (25.9 inches) than did males (21.57 inches; $t = 2.093$, $df = 32$, $p = .044$). Four seating combinations were observed: male-male, male-female, female-male, and female-female; however, because of the random assignment of seating, there were unequal numbers of each combination in the results. Pairings of the same gender did not indicate a significantly different preferred spacing than pairings of mixed genders (23.88 inches versus 24.33 inches). There was no statistically significant difference across the four seating combinations because of low

sample sizes, but the findings suggest that male-male combinations preferred a closer inter-table spacing (19.75 inches) than did all other combinations (24.69 inches).

This preference for tables at least 20 inches apart is of particular interest because most restaurants position parallel tables of two much closer than this. The second pilot study reviewed 25 floor plans of recently constructed full service restaurants and found that parallel tables are positioned between 6 and 18 inches apart (mean distance: 13"), most likely in an effort to maximize the number of tables in a fixed space. There is clearly a discrepancy between preferred table spacing and that typically adopted by the restaurant industry. Therefore this study examines both preferred and typical inter-table distances which conform quite closely to the very close and very far interpersonal distances established by Hall (Hall, 1966).

Study 1

Participants. Study 1 participants were recruited from large undergraduate classes via a recruiting website and encouraged to sign up for the study with a friend. Each participant received $5 in cash for taking part in the study.

Procedure. Participants were asked to report to the test setting and were told that they were providing data for a study on mental agility and would be asked to perform a number of activities together and individually that would gauge their mental dexterity. Participants were greeted by the researcher and seated at tables as they arrived, with the first arrivals being seated at the table closest to the entrance and subsequent parties seated at the adjacent tables in sequence until all participants for each block were in place.

Pairs of participants were asked to work together to develop lists of objects with particular parameters within a time limit of four minutes. The number of responses in each list served as the performance measure. There were three versions of this verbal task, assigned to the pairs in rotation so that adjacent tables were not working on the same problem at the same time. Each version of the verbal task was pre-tested using volunteers recruited from a large undergraduate class to establish instructional clarity, perceived degree of stress stemming from performing the task, and performance baseline scores. The task itself was not intended to be stressful nor did it appear to cause stress based on the pre-test results, although it was possible that the combination of the time limit and the spirit of competition that motivated undergraduate students feel when given a task with a measurable outcome could generate some stress in the participants and perhaps intensify feelings of crowding (Stokols, 1972). This stress, if it occurred, was hypothesized to be magnified in those blocks where table spacing is closest, and therefore the verbal task was intended to serve as a realistic intensifier of any stress effect attributable to table spacing.

The second test was a paper-based visual search test that has been proven to reliably reflect stress levels (Smith & Miles, 1986). This test consists of a five-letter nonsense target sequence that must be identified within a line of sixty individual letters. Participants were asked to circle any instances of the target sequence they could identify in a given line and to complete as many lines as they could within a time limit of five minutes. The number of targets within each line was not disclosed, but varied between 0 and 3 targets per line. There were twenty such lines in the test, and participants were allotted five minutes to complete as many lines as they were able. This test was chosen for this study because of its proven ability to identify stress in respondents due to the high cognitive load inherent in the complexity of the five-letter

target; a low-load cognitive task is less likely to demonstrate any aftereffects of a stressor such as crowding (Cohen, 1980). The test was also valuable in that it did not require a strong knowledge of any particular language.

The third and final task was a manipulation check in the form of a survey asking for participants to provide demographic information and self-reported ratings of affect. The survey asked participants to indicate their current emotional state using a series of a four-point ordinal scales, and has been shown to reliably distinguish between levels of situational stress and arousal (King, Burrows & Stanley, 1983). This task was not subjected to any time limit, but most participants were able to complete the survey in less than five minutes.

Once the participants completed all three tasks, they were excused and debriefed via email after completion of data collection. The entire procedure was performed multiple times for each of three inter-table distances: six inches, twelve inches, and twenty-four inches, and lasted between fifteen and twenty minutes.

In situations where individuals do not perceive that their actions can influence an outcome, stress is more likely to occur (Averill, 1973). For this reason, efforts were made to assure participants that they could to leave at any time during the session, giving the participants some sense of control over their experience.

To provide an additional method of evaluating a stress response, each block was videotaped and the tapes analyzed for evidence of stress through non-verbal behaviors such as body posture shifts away from adjacent individuals, excessive object manipulation, and defensive arm positions (Sundstrom, 1975; Rozelle & Baxter,

1978). Three judges reviewed each tape and coded the behaviors exhibited as being present or not present, and rated the intensity of the behavior on a scale of 1 to 3 with 3 being the most intense. Inter-judge reliability on the presence of defensive non-verbal behaviors was high: in 89.4% of cases, two or more judges agreed on the presence of a given behavior. Inter-judge reliability on the intensity of these behaviors was lower, with two or more judges agreeing on degree of intensity in less than 50% of cases. For this reason, intensity was not included in our analysis.

Results. A total of 92 valid observations were collected over thirteen trials (Table 2.1).

Table 2.1. Sample Size by Inter-Table Distance

Distance	Male	Female	Total
6"	13	17	30
12"	11	18	29
24"	11	22	33
Total	35	57	92

Forty-four percent of participants were of Asian ethnicity, 42% were Caucasian, and the remainder represented a variety of ethnicities. Ethnicity was self-reported by selection from a list of ethnic groupings and no data were collected regarding country of origin.

Stress, Arousal and Performance. Table 2.2 reports the mean levels of stress and arousal derived from the emotional self-report, and the mean performance scores from

the proofreading exercise at each inter-table distance tested. Stress and arousal scores were obtained by the methods established by King, Burrows and Stanley (1983). The proofreading performance score was obtained by counting the number of errors made by each participant while adjusting for the number of lines of text completed during the exercise.

Table 2.2. Stress and Arousal Scores by Inter-Table Distance

Inter-Table Distance	**Stress Score**		**Arousal Score**		**Performance Score**	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
6”	-1.27	4.96	4.73	4.93	10.50	3.14
12”	-2.76	5.49	5.00	6.88	10.31	3.09
24”	-.240	5.80	5.09	7.24	10.09	4.23
Overall	-1.37	5.48	4.95	6.38	10.39	3.52

Stress scores varied across each inter-table distance but did not do so in any systematic or significant way *(F=1.659, df=2, p=.196).* Overall, participants expressed a low level of stress in each condition, with the lowest stress levels being reported at the 12” distance. Arousal scores were considerably higher than stress scores at each distance and increased slightly but not significantly as distance between tables increased *(F=.026, df=2, p=.975).* Proofreading performance also varied by inter-table distance: there were slight but statistically insignificant improvements in scores at the more closely spaced tables *(F=.104, df=2, p=.901).*

Neither distance nor the covariates gender or ethnicity had any significant influence on stress, arousal or performance. The mean stress scores for males and females were identical, and while males had slightly higher arousal and performance scores than females, these differences were not statistically significant. A similar comparison by ethnicity also showed no significant differences between groups. However, the degree to which participants were familiar with their partners did have a significant effect on stress ($F=6.512$, $df = 6$, $p=.012$) but not on arousal or performance. Participants who had no knowledge of their partners when the experiment began consistently indicated a higher level of stress at all three inter-table distances (Table 2.3). However, the distance between tables did not appear to have an effect on perceived stress, as a test for interaction between distance and knowledge of partner was not significant ($F=.779$, $df = 6$, $p=.589$).

Table 2.3. Mean Perceived Stress Scores by Distance and Knowledge

Inter-Table Distance	**Knowledge of Partner**			
	Not at All	Slightly	Some	Very Well
6”	-0.85	0.24	-4.09	-5.50
12”	1.50	-0.58	-4.33	-2.00
24”	0.50	-1.07	-0.92	-4.33
Overall Mean	0.00	-0.58	-3.09	-4.33

An additional measure of stress was obtained via the videotaping of nonverbal behaviors. Nonverbal behaviors that suggest stress such as defensive arm positioning or excessive object manipulation were counted during each of four phases of the

study: at the start, as participants arrived and were seated, waiting for the study to begin; during the collaborative task; during the proofreading task; and during the self-report task. Chi-square analysis indicated that the inter-table distance did not have a significant effect on the presence or number of defensive postures. However, the phase of the experiment did have an effect: there were many more defensive postures identified when participants were performing the interactive task, suggesting that some participants were experiencing stress during this phase (Figure 2.2). Tests indicated that there was no interaction between distance and tasks, either individually by task or collectively, when compared with the starting, non-task condition.

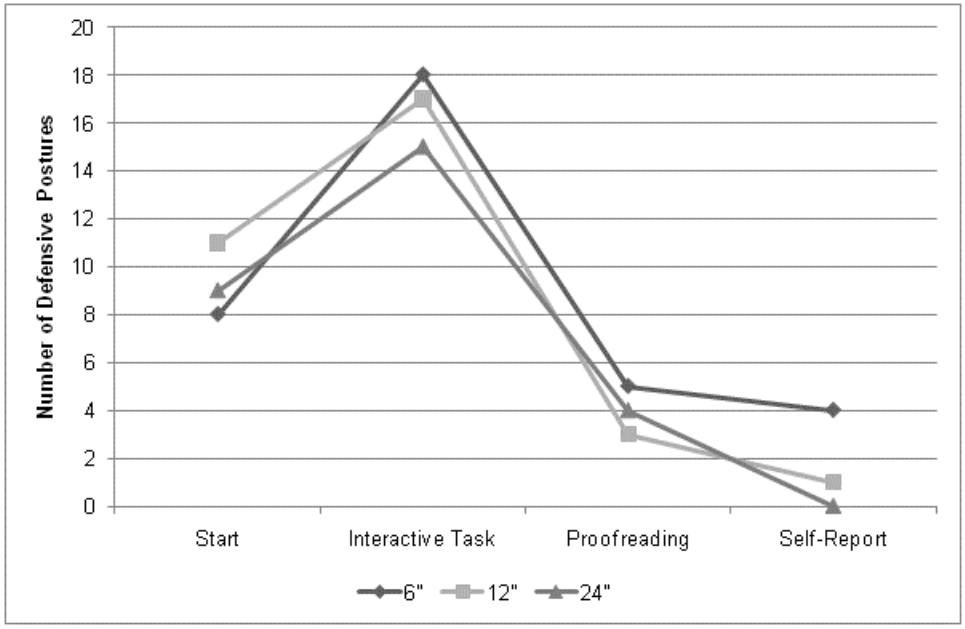

Figure 2.2. Incidence of defensive postures by inter-table distance.

Together, these findings provide no evidence that participants experienced greater stress or arousal when tables were spaced close together than they did at more spacious interpersonal distances, regardless of gender or ethnicity. Stress appeared to be significant only when participants did not know their partners well.

Perceived Crowding. Table 2.4 shows the mean responses to the "Crowded" emotional scale across the three table distances tested.

Table 2.4. Perceptions of Crowding by Inter-Table Distance

Inter-Table Distance	Mean	Std. Dev.
6"	1.60	.770
12"	1.38	.677
24"	1.30	.683
Overall	1.42	.715

Feelings of crowding increased as table distance was reduced but these differences were not significant *(F=1.454, df=2, p=.239)*. The majority of respondents did not report feeling crowded at any of the inter-table distances tested.

There were no significant differences in perceptions of crowding by gender. Where there was a difference in perceived crowding was by ethnicity (Table 2.5). Asian respondents indicated higher perceptions of crowding at each inter-table distance than did Caucasians, and this difference was significant at the .05 level when tables were spaced only 6" apart *(t=2.192, p=.040)*. (The small number of representatives from other ethnic groups in our sample precluded any analysis of groups other than Asians

and Caucasians). However, there was no significant difference in perceived crowding at the other table distances tested.

Table 2.5. Perceived Crowding by Asian and Caucasian Respondents

	Mean Crowding Score			
Distance	**Asian**	**Caucasian**	**t**	**p**
6"	1.82	1.18	2.192	0.040*
12"	1.43	1.36	0.271	0.789
24"	1.31	1.18	0.501	0.621
Overall	1.49	1.25	1.524	1.32

Those who knew their partners somewhat or well had slightly lower ratings of perceived crowding than those who were strangers at all distances, but the differences in these ratings were not statistically significant.

Discussion. The results from this study clearly show that the distance between interacting dyads did not appear to affect feelings of stress, arousal, or perceived crowding, even when that spacing was as tight as six inches apart. This finding came as a surprise given that the literature suggests that such tight spacing would result in significant discomfort (Hall, 1966; Sommer, 1962). There are several possible explanations for our lack of significant findings.

One possibility is the nature of the sample. In the pilot study where students were asked to indicate their preferred inter-table distance, only first year students were used but in Study 1, participants were all in at least their second semester. University

students routinely attend classes in lecture halls with tightly spaced seats, thus they may have become more accustomed to tight spacing since matriculating. This would account for the difference between the preferred inter-table distances suggested in the pilot study and the lack of negative response to closer distances tested in Study 1.

When responses to tight spacing for those who knew their partners well were tested against those who did not, partners that had little knowledge of each other showed significantly higher stress during the sessions than those who were acquaintances or friends, but this stress was not influenced by inter-table distance. There is no way of determining, however, if those seated at adjacent tables were also acquaintances which could have affected the stress scores at close distances.

Another concern was the design of the experiment itself. The interactive task, in this case generating lists of related words, was intended to set up goal-blocking from adjacent tables: dyads would be trying to achieve the longest list of words possible while parties attempting to achieve the same goal at adjacent tables were providing auditory interference. When tables were close together, the potential for goal blocking should have been greater and there should have been increased stress as well as possibly shorter lists. However, what was actually observed was that the list generation task was not particularly engaging for many participants. This may have been because there was no intrinsic or extrinsic incentive to create a long list. There could be little goal-blocking and resulting stress if the goal itself was not sought after.

A final aspect of the study which could have accounted for the lack of significant findings was priming, or in this case, counter-priming. The study title registered with the online recruitment tool was “Mental Agility and Stress”. This title was chosen to

misdirect participants from the true nature of the experiment and instead lead them to believe that their ability to complete mental agility exercises (the word list and the proofreading exercise) under timed conditions was being evaluated. In retrospect, this title may have been misguided. Participants may have surmised that because stress levels were being evaluated as part of the study, they would downplay any discomfort they experienced during the experiment in an effort to appear "better than average." While combining an ostensibly objective measure of stress (the Smith and Miles proofreading test) with the subjective stress measure via the self-report should have helped mitigate any such bias in participant responses, it is still possible that participants were less than forthcoming in their expressions of stress, arousal, or crowding.

Any or all of these problems could have contributed to the lack of significant results in this study. However, there was still merit in the basic methodology for understanding the boundary conditions for discomfort for seated dyads. Clearly a revised study was necessary, using a broader pool of participants and applying a methodology that increased the potential for goal-blocking while avoiding any possible priming among those studied.

Study 2

Participants. A second round of study blocks using a revised methodology was performed three months after the initial study. Study participants were recruited by direct appeal from summer educational programs for high school and professional graduate students and from university employees, all of whom represented different age groups from those participating in Study 1. Because participants were recruited

from pre-established class groups, in most cases, participants were somewhat or well acquainted with each other in each study block. These new participants received summer course credit and/or a 15% discount coupon from a restaurant for taking part in the study.

Procedure. Twelve additional blocks of the study were run in exactly the same setting and format as Study 1. This time an alternative interactive task was assigned: each pair of participants was provided with two copies of the menu for an existing restaurant and a single sheet of open-ended questions that solicited feedback regarding their thoughts about the menu's design and their preferences among the food items listed. Participants were informed that the owners of this restaurant were seeking guest feedback on the menu and were warmly appreciative of the participants' insights and advice. Responding to the menu served as a realistic activity that would encourage interaction within the dyad, and was extrinsically rewarded via the restaurateur's expressed appreciation and offer of discount coupons. The same proofreading exercise and self-report measures, scripts, and timing for the tasks were adopted but the sessions were not videotaped.

Results. Ten blocks of twelve participants and two blocks of eleven participants were run resulting in a total of 141 valid observations (Table 2.6).

Table 2.6. Sample Size by Inter-Table Distance

Distance	Male	Female	Total
6"	18	28	46
12"	20	27	47
24"	14	34	48
Total	52	89	141

Forty-five percent of the participants were of Asian heritage, 46% were North American Caucasian, and the remainder represented a variety of cultural groups. In a few cases, respondents did not complete every measure on the self-report and one chose not to reveal ethnicity, resulting in slightly lower numbers of observations for some of the analyses.

Stress, arousal and performance. While there was no apparent relationship between distance between tables and performance on the proofreading task *(F=.900, df=2, p=.409)*, stress levels appeared to increase as distance increased whereas arousal increased as distance decreased (Table 2.7). The changes in stress observed across the three inter-table distances was not statistically significant *(F=.122, df=2, p=.886).* However, there were significantly higher levels of arousal at the closer table distances when compared with the more generous 24" spacing *(F=3.002, df=2, p=.053).* This finding supports the second hypothesis, in that those seated close to adjacent tables would exhibit higher levels of arousal than those seated further apart.

Table 2.7. Stress and Arousal Scores by Inter-Table Distance

Inter-Table Distance	**Stress Score**		**Arousal Score***		**Performance Score**	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
6”	-1.70	6.45	5.61	5.75	9.85	2.99
12”	-1.36	5.44	4.81	5.91	10.11	2.99
24”	-1.11	5.39	2.74	5.80	9.21	4.01
Overall	-1.39	5.74	4.39	5.91	9.72	3.36

Stress levels did not appear to be affected by inter-table distance, gender, age group, or ethnicity. Only knowledge of partner had any significant effect on stress levels *(F = 7.377, df =2, p=.007)*. As found in Study 1, respondents who knew their partners had much lower stress scores (mean = -4.33) at all table distances than did those who were unfamiliar with those sharing their table (mean=-0.58).

Several variables appeared to offer a significant contribution to arousal responses (Table 2.8). In addition to inter-table distance, the gender of the respondents and the degree to which they were familiar with their partner affected their reported levels of arousal, whereas ethnicity and age group did not appear to have any effect. Males had a significantly higher mean arousal score than females *(t=-3.126, df=137, p=.002),* and at each table distance males reported more arousal than females did, although this difference was only statistically significant at the 12” distance *(t=-2.706, df=45, p=.010)*. Those who knew their partners either somewhat (mean arousal = 6.34) or quite well (mean arousal = 6.67) indicated more arousal at all distances than did those

who had only a little knowledge of their companions (mean arousal = 3.31) or had never met (mean arousal = 3.44). Tests for interactions were not significant.

Table 2.8. Multivariate Model of Perceived Arousal Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	708.448(a)	6	118.075	3.846	.001
Intercept	99.908	1	99.908	3.254	.074
Gender	169.002	1	169.002	5.505	.020*
Knowledge	203.604	1	203.604	6.632	.011*
Ethnicity	3.655	1	3.655	.119	.731
Age Group	46.853	1	46.853	1.526	.219
Distance	216.689	2	108.345	3.529	.032*
Error	4021.523	131	30.699		
Total	7304.000	138			
Corrected Total	4729.971	137			

(a) R Squared = .150 (Adjusted R Squared = .111)

Perceived crowding. As in Study 1, there were no significant perceptions of crowding at the closer table distances; in fact, as shown in Table 2.9, feelings of crowding actually diminished as table distance was reduced, but these differences were not statistically significant *(F=.439, df= 2, p=.646)*.

Table 2.9. Perceptions of Crowding by Inter-Table Distance

Inter-Table Distance	Mean	S.D.
6”	1.34	.76
12”	1.36	.61
24”	1.47	.75
Overall	1.40	.70

There was no significant difference in perceived crowding between genders or levels of familiarity at any distance. Once again, there was no significant difference in crowding by ethnic group, as shown in Table 2.10: Asian respondents had a significantly higher overall mean crowding score *(t=2.010, df=129, p=.046).*

Table 2.10. Perceived Crowding by Inter-Table Distance and Ethnicity

	Mean Crowding Score			
Distance	**Asian**	**Caucasian**	**t**	**p**
6"	1.57	1.26	.816	.419
12"	1.48	1.19	1.531	.133
24"	1.61	1.35	1.181	.244
Overall	1.55	1.27	2.010	.046*

One additional significant finding was the strong correlation between perceived crowding and reported feelings of stress (Table 2.11). While few respondents felt crowded during the experiment, those that did reported a higher level of stress than those who expressed a lesser degree of perceived crowding *(r =.323, p=.000).* Further, stress and arousal scores were negatively correlated *(r = -.208, p=.014)* which provides good support for the ability of the Smith and Miles measure to distinguish between these two related but distinct emotional responses.

Table 2.11. Correlations Among Perceived Crowding, Stress and Arousal

		CrowdedScore	**StressScore**	**ArousalScore**
Crowded	Correlation	1	.323(**)	-.093
	Sig. (2-tailed)	.	.000	.275
StressScore	Correlation		1	-.208(*)
	Sig. (2-tailed)		.	.014
ArousalScore	Correlation			1
	Sig. (2-tailed)			.

The distance between interacting dyads appeared to have no effect on stress levels and only modest effects on levels of arousal. Further, placing tables closer together did not result in increased perceptions of crowding, even at distances as close as six inches.

Discussion

The distance between tables of interacting dyads appeared to have no effect on levels of stress. Stress levels measured by a proofreading task and self-report were not significantly different at any of the three inter-table distances tested. In fact, the only factor that appeared to influence stress was the degree to which participants in the study knew their partners: not surprisingly, interacting with a relative stranger was more stressful than working with someone familiar.

Only one of the hypotheses was supported by the findings: arousal levels increase as inter-table distance decreases. This appears to be attributable in part to gender and knowledge of partner as well as to changes in table spacing. Males were more likely to feel aroused in all spacing conditions, which is not surprising given that males are more sensitive to spatial invasion than females (Patterson, Mullens & Romano, 1971). However, the arousal scores from males did not correlate with increased perceptions of crowding, which suggests that the arousal observed was not associated with a perceived lack of personal space. Those who knew their partners were more aroused than those who did not, and this increased arousal was seen at each of the three inter-table distances we tested. This finding is in contrast to the increased stress felt by those who were unfamiliar with their companions, providing further evidence of a distinction between the constructs of arousal and stress.

While table spacing did influence arousal, it did not appear to affect perceived crowding. Even at tables spaced a mere six inches apart, only 24% of individuals expressed any feelings of crowding at all. This lack of perceived crowding appeared across genders and age groups, and while there were a few statistically significant

differences in perceptions of crowding between Asian and Caucasian participants and between those who had some knowledge of their partners as opposed to those who had less, these findings were not strong.

The observed differences in perceived crowding between Asian and Caucasian respondents were contrary to what we expected to find based on much of the proxemic research. High-context Asian cultures are generally associated with reduced personal space needs (Hall, 1976) and in many cases may be more familiar with crowded conditions in the public sphere, and yet here we found that Asian respondents expressed more discomfort with closer table spacing than Caucasians did. Other research has found that preferences for greater personal space based on ethnicity do not necessarily translate into increased propensity for perceptions of crowding, so these findings may not be that surprising (Evans, Lepore & Allen, 2000). It should also be noted that birthplace and citizenship data were not collected in this study, so it may be that many of the Asian participants had an American background and therefore would be more comfortable with American proxemic norms.

What is unusual here is that conditions that on the surface would appear to elicit feelings of crowding did not do so. The web-based survey outlined in the first chapter resulted in a very clear dislike of closely spaced tables – even tables spaced 24 inches apart were viewed as crowded by many of those respondents -- and yet this experiment provides no evidence that this discomfort actually occurs in a real interactive setting. There are several possible explanations:

Duration. It is likely that the length of time during which individuals are crowded is an important variable; if the length of exposure is too brief or if people are made

aware that tight spacing conditions will be for only a limited time, the lack of perceived control associated with crowding may not be felt. In these studies, participants knew that the close quarters were going to be of short duration and that knowledge may have made them feel more in control of their experience (Staub, Tursky & Schwartz, 1971; Cohen & Sherrod, 1978; Schmidt & Keating, 1979). In addition, in conformance with human subjects protocol, participants were informed that they could withdraw from the study at any time and this may have given them a sense of perceived control that could mask negative reactions to close interpersonal spacing (Gardner, 1978).

Adaptation. Comfort in crowded conditions increases over time (Sundstrom, 1975). Perceived crowding was measured at the end of the experiment, at which point participants may have adapted to circumstance and become less sensitive to crowding. Nonverbal behaviors observed in Study 1 provide some support for this view: there were increased defensive postures early in the experiment when participants were being seated and while they interacted with their partners, and a reduction in these behaviors as the experiment went on. This suggests that there was some discomfort on the part of many participants at the beginning of the session, although it cannot be determined from these data whether that discomfort was due to the spacing of the tables or other factors such as nervousness from being studied or unfamiliarity with the study setting.

Familiarity. For college students, working in close quarters is not unusual. Tightly packed cafés are often popular study spots and therefore the close table spacing condition in this experience may not have been noticeably outside the norm for this demographic. While there were not large numbers of older adults in this study,

increasing the participant pool in Study 2 to include high school students (ages 15-17), professional masters students (ages 22-29), and university employees (ages 28-55) allowed a comparison across age groups. There was no difference in responses to close table spacing by age and therefore it could be that sitting close together for a limited period of time is a familiar occurrence for many people in an academic setting.

Impression management. Those who are actively managing the impressions they make on others tend to limit displays of negative affect, particularly when confronted with a potentially stressful situation (Leary & Kowalski, 1990; Lewis, 2000). Young adults, particularly those at competitive universities, are very likely to be concerned with how they are perceived by others and therefore might be less inclined to reveal negative emotions on a self-report. In Study 1, participants were informed that their stress levels were being tested. It is possible that participants might have downplayed their emotional responses in an effort to appear more relaxed and in control than they actually felt. However, in Study 2, the stress construct was not made salient in any way and yet the findings remained very similar. If there had been some conscious masking of true emotion in the first study, it clearly did not have much effect on overall findings.

The presence of the camera in Study 1 might also have influenced participant responses. Van Rompay, Vonk and Fransen (2009) demonstrated that people are more likely to conform to social norms when being openly filmed. Those social norms might include appearing nonchalant in unique circumstances. Partially for this reason, Study 2 was performed without the camera being present to see if there was any change in stress or arousal levels that might be attributable to being filmed. There were no significant differences in stress or arousal responses between blocks that were

filmed and those that were not, suggesting that the camera itself was not influencing participant responses.

Insensitivity of measures. It may be that the measurement instruments selected for these two studies were insufficiently sensitive. Although Smith and Miles (1986) found their proofreading task to be an effective measure of stress in a workplace setting, in these studies there was no correlation between the number of errors made or lines completed on the Smith and Miles test and reported stress. It is possible that the kind of stress experienced in the Smith and Miles study is different from stress stemming from reduced personal space and thus the Smith and Miles measure was unable to identify stress responses in these experiments. Another method of identifying stress, such as testing for cortisol in saliva, while perhaps being more invasive, may be a better way of establishing whether spatial density generates a stress response.

The other measurement tool used -- the King, Burrows and Stanley (1983) emotional self-report scale -- has flaws that could have contributed to the lack of significant findings. This measure uses a four-level scale to assess the degree to which an individual feels a given emotion: 4-Definitely Yes, 3-Slightly Yes, 2-Not Sure or Slightly Not, and 1-Definitely Not. There is no way to determine whether those who respond with "2" are not certain whether they feel a particular emotion, do not understand the question, or perceive the scale as a continuum and rate their emotional response as a two on a scale of one to four. While the measure appeared to do an effective job of distinguishing between the stress and arousal constructs in this study, it cannot with any certainty be established whether the instrument accurately reflected perceived emotions.

Any of these issues alone or in combination may explain why the study hypotheses were not supported by these results. However, a likely reason for the lack of significant findings is that responses to reduced personal space are contextual: what is considered uncomfortably close will vary depending on the circumstance as much if not more so than on the individual (Desor, 1972; Knowles, 1980; Gifford, 1982). Study participants had no real basis upon which to evaluate whether the spacing between the tables was appropriate or not because their experience was out of context: taking part in a group experiment while seated at café tables was likely to be an unusual occurrence for most if not all of our participants. Thus the inter-table distance may have been just part of the unique experimental setting and not recognized as being particularly close. But in another, more familiar context – say, a restaurant – tables spaced at 6 inches apart might be immediately identified as uncomfortably close. This would explain why respondents to the web-based survey were so vehement in their displeasure regarding closely spaced tables, as the 6 inch distance may have been viewed as highly inappropriate in a restaurant context. Therefore to get a more accurate picture of stress or arousal responses to reduced personal space, contextual factors will need to be incorporated into the analysis. These factors might include familiarity with the setting, expectations, or the user's goals for the experience. For the third study in this work, user frequency, familiarity with the setting, and place of residence – urban vs. non-urban -- are evaluated as contextual moderators.

The two experiments described in this chapter had significant limitations: they relied on an artificial setting that lacked context, used only simple and non-invasive methods for measuring emotion and behavior, and were of short duration. But even with these limitations, this work is valuable in that it demonstrates that tight inter-table spacing in

and of itself is not enough to generate discomfort. Additional research that examines tight seating in different contexts is needed to uncover which design factors contribute to negative responses to high table or seat density. Some of this work on secondary environments has been started, notably in classrooms (Guyot, Byrd & Caudle, 1980; Kaya & Burgess, 2007) and on public transit (Evans & Wener, 2007). However, no research has been identified that tests spatial density effects on seating at tables.

The next chapter examines seating in restaurant environments, selected not only because they have been little studied but also because they represent a secondary environment in which responses to space have important economic effects. If close inter-table spacing does not in fact engender feelings of stress or crowding, then tables might be more closely spaced than is currently typical practice. As was found in one of the pilot studies, restaurants typically position parallel tables roughly twelve to fifteen inches apart. If the findings from Studies 1 and 2 are reflective of typical behavior, it might be possible to reduce this inter-table spacing and thus provide additional capacity in high-volume operations. Likewise, more seats might be able to be placed around communal tables in restaurants, libraries, and other shared spaces. This has implications both for revenue management and for interior design. Higher capacity suggests increased revenue potential assuming there is unsatisfied demand, so adding even two more seats in a popular restaurant could substantially increase the operation's top line. And if close table spacing does not make people feel crowded, designers can not only increase seats when they lay out a space but also may have greater choices in terms of size and shape of furniture.

Environments affect perceptions and behavior but do not do so piecemeal; just placing tables close together is not enough to generate feelings of stress or crowding. Further

research that puts table spacing in context will hopefully build the understanding of the effects of reduced personal space on user comfort and behavior. In the next chapter, a field experiment that manipulated table spacing in a restaurant setting allowed for the examination of behaviors and attitudes in what is perhaps the most common public setting where users area seated at adjacent tables, and one in which user goals and expectations – a good meal, smooth service, and a pleasant interaction with companions -- might be evaluated to see how close table spacing responses are affected by context.

CHATPER THREE:
PERSONAL SPACE IN THE RESTAURANT SERVISESCAPE AND ITS EFFECTS ON SATISFACTION AND BEHAVIOR

Introduction

The physical environment in which services take place is a critical aspect of guest satisfaction (Kotler, 1974; Bitner, 1992). Researchers in services management, marketing, psychology and the design disciplines have begun to build a body of knowledge about elements of the servicescape that influence consumers' attitudes and behaviors. Moreover, some attention has been given to the mechanisms underlying these effects. Atmospheric elements of the servicescape – notably music, lighting and scent -- have been closely studied (Turley and Milliman, 2002) but the allocation and layout of space have not. This omission from the servicescape literature is surprising given that the provision of space is among the earliest and most expensive decisions that must be made when designing service environments.

The majority of experiential services depend upon the provision of an appropriate amount and quality of space for each aspect of the service. The amount of space provided not only supports service activities but also communicates with customers and sets service expectations. In many services, a specific amount of space is defined for each customer or party: a seat in a theatre, a locker in a spa dressing room, or a table in a restaurant. How much space to allocate is generally a function of the requirements of the service process and the characteristics of the experience that the service provider intends to offer, but what is rarely assessed is whether the space is actually supporting the service provider's objectives. What may appear to be an

efficient allocation of square footage may in fact be resulting in negative consumer perceptions. A familiar example is the common practice of placing restaurant tables close together as a way of maximizing service capacity. Placing guests too close together may violate their sense of personal space, increase physical and psychological discomfort, and diminish satisfaction with the service. The primary goal of this study is to test this relationship between table spacing and outcomes for all types of services that feature pairs of users seated in a common space.

Studies on proxemic behavior suggest that interpersonal spacing is important to psychological comfort and well-being (Middlemist, Knowles and Matter, 1976; Long, 1984; Evans and Wener, 2007), but little work examines the effects of personal space in service environments. There are very few studies that measure actual responses to space allocation in a service environment, and even fewer that appear to assess personal space for seated users rather than for those who are free to move about the servicescape. This study breaks new ground by examining consumer responses to specific space allocations in a service environment and by providing a theoretical basis for why these responses might influence behavior and satisfaction.

A table-service restaurant was selected as the setting for this research. Restaurants offer two unique characteristics that make them a suitable setting for this study: a convenient way to control interpersonal spacing through the allocation of specific tables to dining parties, and variable spending that is only determined at the end of the experience. Further, restaurant consumers have a greater degree of control over the duration of the service experience than do the users of other seated services such as theatrical entertainment, sporting events, or public transportation. In this experiment, the interpersonal spacing of users was manipulated by rearranging tables in a

restaurant's dining area and assessing the effects on customer satisfaction as well as on consumer behavior, operationalized as spending and service duration. While satisfaction is paramount to the ongoing success of any service operation, concrete measures of spending and duration are critical to service operators because of the role they play in revenue management. In services where there is constrained capacity, balancing consumer spending with the duration of the service experience maximizes revenue (Kimes et al., 1998). For services like restaurants where customers choose how much to spend while the service experience is unfolding, the attributes of the space they occupy during the service experience may activate conscious and unconscious responses that could influence their evaluations of the service. This in turn could affect how long they stay and how much they spend. This study investigates the relationships between space, satisfaction and behavior, and whether revenue might be affected by providing customers with more or less space for their service experience.

What follows is a theoretical framework linking the physical environment to user satisfaction and behaviors, followed by a description of the conceptual model for this study. The results of the field study are then presented and their implications for service providers are discussed. The goal of this work is to introduce the concept of space allocation as an important input in the service experience and to provide empirical evidence for how space allocation affects users in physically constrained service environments, particularly hedonic ones. Most research into proxemic preferences and behaviors has examined negative or at best neutral settings, making this study a unique and important contribution to the environmental psychology literature.

Conceptual Background

Servicescapes. The term "servicescape" has been defined as the physical setting in which a service conducts its transactions with customers (Bitner, 1992), as well as the social aspects of the environment such as the presence of other customers and of employees (Baker, 1987; Tombs and McColl-Kennedy, 2003). The servicescape serves several purposes: it supports the spatial and functional needs of the transaction; it communicates meaning to the users through the use of finishes, materials, light, sound, signage, artifacts, and other design elements; it creates and reinforces an identity for the operation in the minds of consumers; and finally it offers stimulation to both consumers and employees, ideally in ways that support the goals of the organization. The challenge for any service business is to effectively match the elements in the servicescape with the needs, resources, and goals of the operation and its customers, a feat made more difficult because there is still a great deal that is not known about precisely how servicescapes influence users in any given context. There has been substantial research into the effects of specific tactical adjustments to the servicescape, collectively termed "atmospherics" (Kotler, 1974), but less work has been done on the theoretical constructs behind these effects or on the strategic application of design to a service environment (Ezeh and Harris, 2007).

The servicescape does not directly cause people to think or behave in certain ways. Attitudes and behaviors are mediated by a person's emotional responses to the environment, many of which are difficult if not impossible to predict (Donovan and Rossiter, 1982). Dubé-Rioux, Schmitt and Leclerc (1989) observed that the affective reports of consumers are highly predictive of level of satisfaction and may be more predictive of satisfaction than are cognitive evaluations. Emotions are also important

in service settings because of the intangible nature of the service product. The more intangible a service is, the greater the need to provide tangible physical evidence that reflects the intended or likely experience to follow (Shostack, 1977; Zeithaml, 1988).

Insights derived from two interrelated theories – inference theory and schema theory – constitute the conceptual foundation for hypotheses regarding the influence of servicescapes on consumer perceptions. Inference theory argues that people make judgments about the unknown on the basis of information they receive from the sensory cues that are available to them (Huber and McCann, 1982). This information is combined into cognitive structures called schemas which connect and organize prior knowledge abstracted from experience. These schemas guide inferences and predictions that help shape people's expectations in new or ambiguous contexts (Fiske and Linville, 1980). These theories together imply that consumers attend to design, social and ambient environment cues when evaluating service settings because they believe that these cues offer reliable information about perceived service quality (Bitner, 1992; Brady and Cronin, 2001; Newman, 2007).

Bitner's servicescape model (1992) states that physical attributes in the servicescape – its ambient features, its spatial and functional characteristics, and the meaning embedded in its design – combine with user mood to affect the physiological, emotional, cognitive and behavioral responses of all users, whether they are customers or employees. The specific behavioral responses to the servicescape are either approach behaviors such as entering an environment, choosing to lengthen the experience, and interacting with others in the setting, or avoidance behaviors which include leaving the environment, social withdrawal, and negative attitudes toward the setting (Mehrabian and Russell, 1974).

Wakefield and Blodgett (1996) developed an alternative, streamlined servicescape model that describes a number of environmental dimensions – among them the layout of furnishings and seating comfort – that directly contribute to the perceived quality of a service environment which in turn influences the specific approach behaviors of satisfaction, desire to stay and desire to return. The Wakefield and Blodgett model emphasizes the built environment only because it is more under management's control, in contrast with the Bitner model which includes the moderating effects of inputs from consumers themselves and from employees. Fiore and Kim (2007) suggest a more detailed list of moderators of the strength and direction of the relationship between servicescape stimuli and consumer response, including the degree of sensation-seeking or arousal-seeking on the part of the consumer, the purpose of the service transaction, and time pressure. Many researchers have identified pleasure as an important mediator between the servicescape and satisfaction (Donovan and Rossiter, 1982; Hui and Bateson, 1991; Donovan et al., 1994). Elements of the servicescape induce feelings of pleasure when those elements either support the users' goals or offer physical and psychological comfort (Dubé-Rioux, Schmitt and Leclerc, 1989). A mismatch between the design of the servicescape and user needs and desires contributes to negative affective response and reduced satisfaction.

Personal Space, Stress and Privacy. Most services that require a physical setting for their delivery have multiple customers using the same space. The presence and proximity of others can be stressful if the number or density of other users exceeds a desirable level and encroaches on personal space. The concept of personal space is a familiar one: each person constructs a system of invisible boundaries that are used to maintain psychological comfort in social settings and to control access to the physical and emotional self (Hall, 1966; Altman, 1975). Hall (1966) described a series of

measurable thresholds of personal space depending on the relationship between the interactants in a social encounter, noting that these thresholds also varied with the age, gender, and ethnicity of the participants, but this literal approach to personal space has been largely rejected in favor of a much more malleable and situation-specific conceptualization (Stokols, 1972; Knowles, 1980). Personal space requirements will be very different for patrons of a bar who may be seeking social interaction with new acquaintances as opposed to users of a bank automatic teller machine who seek privacy while they conduct their transactions.

A lack of adequate personal space often leads to a perceived lack of privacy. Disequilibrium between desired privacy and actual privacy generates a stress response that triggers emotional discomfort and avoidance behaviors (Dosey and Meisels, 1969; Patterson, Mullens and Romano, 1971; Altman, 1975). Researchers have proposed a number of theoretical causes for the stress induced by a lack of privacy: external constraints on behavioral choice (Proshansky, Ittelson and Rivlin, 1970; Stokols, 1972; Sundstrom, 1975); overstimulation (Evans, 1979; Wohlwill, 1974); or a lack of behavioral control (Altman, 1975; Schmidt and Keating, 1979). All three theoretical models share the idea that reduced privacy generates a stressful condition. In the behavioral choice model, privacy represents the freedom to choose how much access others may have to ourselves, and therefore invasions of privacy occur in those circumstances which remove some or all of our ability to choose our own behaviors. In the overstimulation model, invasions of privacy are thought to increase arousal levels by placing an overload on our sensory systems (Evans, 1978). The most prevalent model of privacy holds that encroachments by others reduce the perceived control that individuals have over themselves and their experiences. While privacy

can be invaded in non-physical ways, many privacy invasions that take place in public service settings are encroachments into personal space.

Reducing personal space does not automatically induce discomfort. The objective measure of density is distinct from the subjective measure of crowding (Stokols, 1972). Only if an invasion of personal space is perceived as threatening or limiting goal attainment will there be a stress response (Proshansky, Ittelson and Rivlin, 1970; Stokols, 1972; Altman, 1975; Sundstrom, 1975; Schmidt and Keating, 1979). Stress responses generated by an invasion of personal space are typically alleviated by avoidance behaviors such as moving away to create more interpersonal space or, when this is not possible, changing body position and/or focus (Argyle and Dean, 1965; Mehrabian and Russell, 1974). Another strategy to reduce the potential for a privacy invasion is to limit physical exposure as much as possible; much work has been done showing that individuals desiring greater privacy will seek out spaces that are framed by architectural features or "anchors" on one or more sides (Evans and McCoy, 1998; Robson, 2008). This preference for carefully delineated personal space can be seen in servicescapes such as restaurants, where patrons show a clear preference for booths and for corner tables (Kimes and Robson, 2004), particularly in stressful situations (Robson, 2008). Effective servicescapes must be able to balance users' needs for control over privacy with the appropriate and cost-effective allocation of physical space.

Perceptions of Space and Spatial Requirements. Although physical space can be considered an objective construct that is measurable and mathematically defined, it also has subjective connotations that are important to consider when allocating space in service settings. Space can be both explicit and perceived. Explicit space is the

actual square footage allocated to a particular use whereas perceived space is the amount of space that an individual is conscious of, which may in fact be larger or smaller than the amount of space allocated or occupied. The servicescape may be designed to provide a larger sense of space than is actually provided so that users are more comfortable or satisfied, or behave in particular ways. A classic example of such a strategy is to provide mirrors along one wall of a room to create the effect of a much larger facility. Windows can also extend the boundaries of perceived space: in a study of office design, employees were happier and felt they had more space when their work stations were adjacent to a window even though the square footage of the workstation did not change across conditions (Yildirim, Akalin-Baskaya and Celebi, 2007).

The preferred amount of space varies by individual. Culture, gender, relative power or status, age, and the degree of stimulation expected or desired in the experience all serve as moderators to the amount of personal space desired (Hall, 1966; Kaya and Burgess, 2003; Robson, 2008). Generally, in most North American cultures, more personal space is required in situations where there is the potential for stress, either due to the presence of unknown others or the potential for some kind of threat or discomfort (Hall, 1966; Evans, 1979). In service environments, greater personal space may be associated with luxury, deference, or special status (for example, stadium skyboxes, corner booths in restaurants, and front-of-the-plane seating on aircraft). However, greater personal space can also be an indication of social ostracism, as can occur when subway users give a wide berth to those who appear to be mentally ill. Space used in public settings, then, is a function of both the individual using the space and the reactions of others toward that person.

Lastly, personal space requirements vary by context. In service settings where interaction with others may be an integral component of the experience, such as nightclubs or sporting events, reductions in personal space are viewed with equanimity if not even sought after, whereas in services where privacy is a prime concern – spas, banks, physician's offices – personal space is eagerly sought and may be rigorously defended (Middlemist, Knowles and Matter, 1976; Goodwin, 1998).

Space and the Servicescape. Most research into user behaviors and preferences in service environments has been to establish responses to atmospheric features such as lighting, music, and scent. Among the studies that have examined the role of personal space in servicescapes has been Hui and Bateson's (1991) research on crowding in which they indicate that crowded service environments suggest reduced satisfaction and avoidance behaviors. However, this work was done using projective techniques rather than real service environments, as is the case with much of the crowding research related to restaurants (Tse, Sin and Yim, 2002; Noone and Mattila, 2009). Some have found that projective techniques tend to be poorly correlated with actual behaviors in personal space research (Hayduk, 1981).

Other studies of crowding that used real service environments have found that the presence of others can influence duration, spending, satisfaction, and even brand choice (Harrell, Hutt and Anderson, 1980; Machleit, Kellaris and Eroglu, 1994; Argo, Dahl and Manchanda, 2005). However, many of the studies that have examined responses to personal space in service environments have failed to clearly distinguish between crowding, crowdedness and density, and only rarely provide objective measures of space allocation and utilization.

There is also evidence that many services do not meet users' privacy expectations. In a study of factors contributing to guest satisfaction in Hong Kong restaurants, "dining privacy" received the lowest performance rating among 28 experiential attributes, suggesting that restaurants were not doing an acceptable job of supporting diners' privacy needs (Kivela, Inkabran and Reece, 1999). Few studies of satisfaction address the servicescape much beyond surveying users very generally about ambient factors and layout (Andaleeb and Conway, 2006; Kim and Moon, 2009), with only infrequent investigation of personal space preferences and their role in overall service satisfaction (Anderson, Pearo and Widener, 2008). Yildirim and Akalin-Baskaya (2007) tested emotional responses to restaurant table arrangements but did not evaluate actual spending or duration behavior. Our study therefore addresses a notable gap in the servicescape literature.

Conceptual Model and Research Questions

In service settings, consumer comfort is an important antecedent of satisfaction which in turn is key to profit (Donovan et al., 1994; Turley and Milliman, 2000). Therefore the design of the servicescape must consider users' physical and psychological comfort. This study examines one aspect of servicescape design – the spacing of restaurant seating – to determine whether seating that reduces personal space translates into a measurable decrease in satisfaction and to observable changes in consumer behavior as a result of diminished pleasure. Figure 3.1 illustrates the conceptual model for this study.

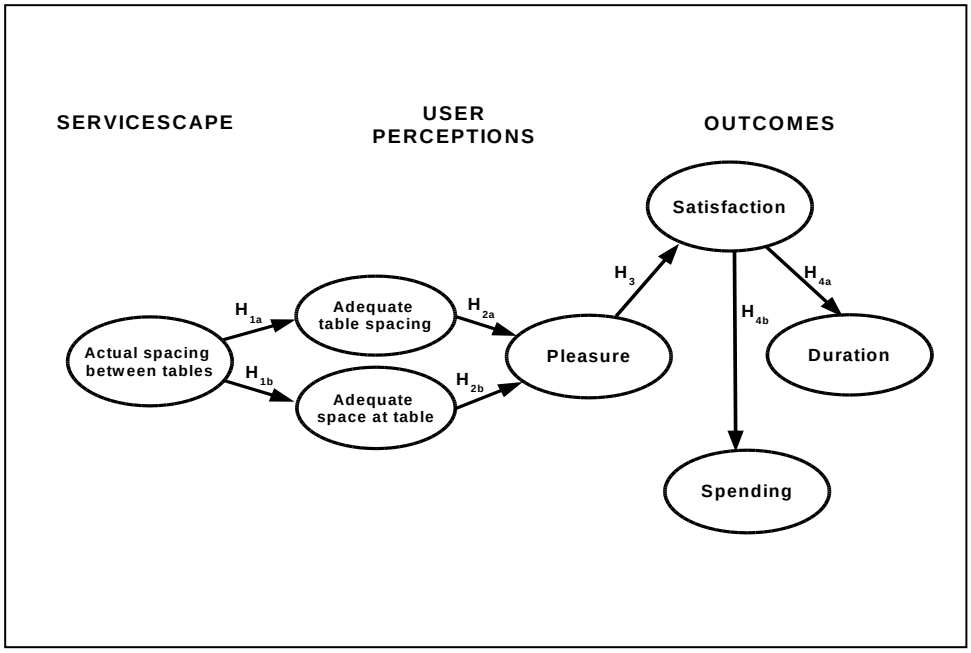

Figure 3.1. Conceptual model.

Stress responses in physical environments result from a disequilibrium between the actual state and the desired state (Altman, 1975). The amount of space desired by users will be a function of the context of the service as well as the user's perceived ability to control that space. Further, consumers may perceive that they have more or less space than they have been explicitly allocated. Thus any study of the seating needs to take into account both the explicit space taken up by and between each seat but also consumers' responses to the perceived space that each seat affords. In this model, explicit space is conceptualized as the objective measurement between restaurant tables. The user's perception of space is reflected in consumers' subjective ratings of the adequacy of spacing between tables and the adequacy of the personal space they feel they have at their tables. Disequilibrium between the personal space that is offered and the amount of space that is considered adequate is likely to reduce pleasure and result in dissatisfaction, and this dissatisfaction in turn may result in

avoidance behaviors such as reduced spending or a shorter duration (Mehrabian and Russell, 1974; Donovan and Rossiter, 1982; Sherman, Mather and Smith, 1997; Wirtz and Bateson, 1999).

To determine whether the explicit space provided to patrons in a service setting has a measurable effect on ratings of perceived space, pleasure, overall satisfaction, or on duration and spending behavior, seven specific hypotheses were tested. Earlier research has indicated that having strangers in close proximity generates negative affect (Evans, 1978). As confirmation of this basis for user perceptions, it is hypothesized that:

H_{1a}. Diners seated at tables that are close together will feel that table spacing is inadequate when compared with tables that are spaced further apart.

H_{1b}. Diners seated at tables that are close together will feel that they have less personal space at their tables than diners seated at tables spaced further apart.

Hui and Bateson (1991) maintain that pleasure serves as a mediating variable between perceptions of control and consumer behaviors. It is possible that having reduced personal space limits perceived control which in turn may reduce the pleasure that consumers derive from the service experience. Therefore it is hypothesized that:

H_{2a}. Diners that feel their tables are too close to others will rate their experience as less pleasurable when compared with the ratings of diners who do not feel other tables are too close.

H_{2b}. Diners that feel they do not have enough personal space at their tables will rate their experience as less pleasurable when compared with the ratings of diners who feel that they have enough personal space.

Pleasure is a key antecedent of satisfaction (Mehrabian and Russell, 1974; Donovan et al., 1994). Satisfaction is generally regarded as desirable in any service setting, and particularly so in those environments where repeat business and positive word of mouth are crucial for organizational success. This research seeks to confirm this relationship between pleasure and satisfaction by testing the following:

H_3. Diners that rate their experience as less pleasant will express lower rates of satisfaction with the service experience than diners that rate their experience as more pleasurable.

In commercial services, satisfied consumers are more likely to adopt approach behaviors such as a longer length of stay or increased spending (Donovan et al., 1994; Sherman, Mather and Smith, 1997). However, there are few studies that test the effect of satisfaction on actual spending and duration behaviors in restaurants. Most of the recent work that investigates restaurant satisfaction either relies on projective methods (Dubé, Renaghan and Miller, 1994; Tse, Sin and Lim, 2002) or on retrospective surveys and does not investigate the actual spending or duration behaviors of those completing the surveys (Auty, 1992; Andaleeb and Conway, 2006; Gupta, McLaughlin and Gomez, 2007; Jang and Namkung, 2009; Kim and Moon, 2009). One of the few studies that compares restaurant satisfaction to actual behavior looked at duration but not spending (Noone et al., 2007). To establish whether there is a

significant relationship between satisfaction and spending as well as dining duration, it is hypothesized that:

H_{4a}. Diners that have lower ratings of overall satisfaction will have a shorter service duration than diners with higher ratings of satisfaction.

H_{4b}. Diners that have lower ratings of satisfaction will spend less than diners with higher ratings of satisfaction.

While satisfaction is of course important to services, so too is the efficient allocation of scarce resources to a particular service encounter so that revenues are maximized. Service operators seek to maximize capacity during times of peak demand, but the increased capacity created by closely-spaced seating may in fact be detrimental to the long term goals of the operation if the net result is user dissatisfaction.

Space allocation decisions are typically made relatively early in service planning and are often made by design professionals rather than by the service providers themselves. A clear understanding of the psychological and behavioral implications of reduced personal space is therefore important to both the service industries and the professions that create service facilities on their behalf. Many studies have shown that the design of a restaurant appears to affect consumer attitudes (Auty, 1992; Mattila, 2001; Tse, Sin and Lim, 2002; Andaleeb and Conway, 2006; Gupta, McLaughlin and Gomez, 2007; Jang and Namkung, 2009; Kim and Moon, 2009) but there is little if any direction about specific restaurant design elements that can help an operator create a successful servicescape. This study offers a practical contribution to the servicescape literature by providing empirical evidence for the effects of a very

specific design decision: the spacing of tables. In addition the study examines the constructs of explicit versus perceived space and connects these to theoretical issues related to personal space and privacy in service environments.

Methodology

A convenience sample of patrons in a full service, dinner only restaurant in New York City served as the participants in this study. A restaurant setting was chosen for this study because the length of the service experience and the amount spent during the service are more in the control of the consumer than in many other services and therefore would be more likely to reveal effects of the servicescape on spending or duration.

A portion of the restaurant's dining room was selected as the study area and matched with similar seating in the same dining room that could serve as a control. In both cases, the seating areas selected were parallel rows of tables for two (Figure 3.2). This type of seating allowed for manipulation of the distance between the parallel tables in the experimental area while all other aspects of the seating configuration could be held constant. The experimental seating was along a unique system of parallel tables: standard 27" x 30" table tops were affixed to a metal bar of roughly 30 feet long and could slide along this bar to be repositioned at any inter-table distance. Free-standing chairs were positioned down both sides of the tables, allowing easy access for guests and staff from either direction. The experimental seating area was usually set with ten tables but an additional two tables could be added when demand for seating was high. The control seating was along a traditional restaurant banquette in the same dining room, with ten tables for two spaced 12 inches apart although some of these tables

were joined together into tables for four during most nights of operation. Other than adjusting the table spacing in the experimental seating area, there was no manipulation of the dining environment or service processes during the study.

Figure 3.2. Control and experimental seating in the restaurant studied.

Inter-table distances of 6 inches and 12 inches were selected for this study. The 12 inch distance was selected because it is common restaurant industry practice to space parallel tables along banquettes at roughly 12 inches apart[1]. The 6 inch inter-table distance, while less common, was selected for two reasons: it is a distance typically

[1] The prevalence of 12 inch table spacing was determined by a review of restaurant floorplans published American commercial interior design magazines during the previous two years.

adopted with intimates rather than strangers (Hall, 1966) and therefore is likely to generate feelings of discomfort when other guests are seated at adjacent tables spaced so closely, and 6 inch table spacing is also occasionally adopted by restaurants in an effort to maximize service capacity in areas where real estate costs are high and/or demand is particularly strong.

Studies of restaurant patron behavior have shown that as party size increases, the length of stay increases (Graves et al., 1982; Sommer and Sommer, 1989), so for this reason the study was restricted to only parties of two to control for any effect of party size.

Data for this study were collected on evenings that represented typical nights of operation, free from special events, and when a sufficient number of parties of two were forecast to provide an adequate pool of observations. The restaurant management set up and confirmed the spacing of the tables prior to opening each evening using a standardized measuring tool. There was no further adjustment to the typical service processes of the restaurant: guests at the experimental banquette were seated and dined as they would under normal restaurant circumstances. At the completion of the meal, the server approached the table with the guest check, two copies of this study's survey instrument, and two pens with the restaurant logo which the guests could keep if they wished. The servers informed the guests that a satisfaction study was taking place, asked guests to complete the surveys anonymously and place them inside the check folder for collection, and were thanked for their participation. Servers collected the payment and the completed surveys, then closed each check on the point-of-sale system right away in order to capture duration. At that time, servers stapled a copy of the guest check to each completed survey so that survey data could be matched with

the relevant point-of-sale data for analysis at a later time. Servers were not informed of the study's hypotheses nor were the guests who participated.

The dependent variables in this study were dining duration, measured from the time that the guest check was opened to the time it was closed in the point-of-sale system; spending, operationalized as the average check for each party calculated from the point-of-sale system data; and self-reported ratings of the food, service, table, and overall satisfaction. Respondents were also asked to provide their gender, age, dining frequency, and area of residence. A sample of the survey instrument appears in the Appendix.

Results

Sample. A total of 133 parties of two participated in the study over twelve different evenings during the autumn of 2009. Sixty of those parties were seated at tables in the experimental area – 27 parties at 6 inch spacing and 33 parties at 12 inch spacing -- and the remaining parties were seated at the control tables. There were 84 valid surveys collected, resulting in a response rate of 63.2%. Spending and duration data from parties of two that did not complete surveys were included in the analysis of point-of-sale data after an initial test indicated that there was no significant difference in spending or duration behavior between those that completed surveys and those that did not.

The survey sample had slightly more females (58.3%) than and was made up largely of first-time visitors to the restaurant (76.2%). Just over 70% of the sample was between the ages of 22 and 35, while 21.4% of the sample was between 36-50 years

old. Roughly half of the respondents were residents of New York City (53.6%) and 76.2% ate out at least once a week. Not all respondents completed every survey question.

The distributions of responses to the survey questions were highly skewed, and this coupled with the relatively small sample sizes at each distance suggested that the Mann-Whitney U test was a better choice for the analysis of these variables[2]. After log transformation, the spending and duration measures were normally distributed.

Explicit Space Effects. The hypotheses regarding explicit space – that consumers seated at the 6 inch distance would feel that adjoining tables were too close and that they had less room at their tables when compared with those seated 12 inches apart – were not supported: at the 6 inch distance, respondents indicated that they felt the neighboring tables were closer (M = 4.28) than did those seated at experimental tables at the 12 inch distance (M = 3.94; $U = 541.0, z = -.461, p = .644$) but this difference was not significant. Surprisingly, ratings of closeness were relatively moderate for both distances; a total of only 25 respondents across both inter-table distances rated neighboring tables as being somewhat or much too close to theirs.

Those seated at tables spaced 12 inches apart rated the amount of room they felt they had at their tables slightly higher (M = 5.81) than those seated at tables spaced 6 inches apart (M = 5.39) but again this difference was not statistically significant ($U = 568.5, z = -.121, p= .904$). In fact, there was no significant differences in any measure

[2] Standard t-tests were also conducted on these variables, but there were no differences in outcomes between parametric and non-parametric methods.

of satisfaction or behavior between patrons seated 6 inches apart versus those seated 12 inches apart (Table 3.1).

Table 3.1. Comparison of Responses to Explicit Space Manipulations

	6" Spacing *(n = 27)*	**12" Spacing** *(n = 33)*	**T-test**		**p**
Behavioral Measures	**Mean (SD)**	**Mean (SD)**			
Average Check	$63.56 (16.77)	$72.50 (21.87)	-1.646		.105
Duration (Minutes)	102.1 (37.5)	110.2 (41.2)	-.789		.433
Spend per Minute	$.659 (.183)	$.728 (.138)	-.848		.400
Satisfaction Measures			**U**	**z**	**Sig.**
Pleased	6.22 (.732)	6.44 (.629)	557.50	-.270	.787
Enough Room at Table	5.39 (1.614)	5.81 (1.424)	568.50	-.121	.904
Good Food	6.28 (.895)	6.25 (.775)	553.50	-.322	.747
Service Rushed	1.39 (.979)	2.19 (1.682)	479.00	-1.381	.096
Good Staff	6.56 (.571)	6.69 (.602)	562.50	-.226	.821
Tables Too Close	4.28 (1.934)	3.94 (1.436)	541.00	-.461	.644
Overall Satisfaction	6.82 (.767)	6.63 (.806)	522.00	-.081	.935
Will Return	5.56 (1.580)	5.81 (1.424)	562.00	-.203	.839
Will Recommend	6.11 (1.231)	6.06 (.998)	479.00	-1.316	.167

Perceived Space Effects. Table 3.2 depicts the correlations among responses to personal space and table closeness with other measures of service satisfaction. (Non-parametric Spearman's rho correlations were used because several of the variables

were non-normal even after transformation efforts.) Although the actual table spacing did not appear to influence guest responses or behaviors in any way, perceived space did have significant effects on pleasure and in some cases satisfaction with other aspects of the dining experience. Guests that felt that neighboring tables were too close, regardless of the actual inter-table spacing, had significantly lower pleasure scores than those who did not find the table spacing to be a concern. Likewise, ratings of the adequacy of personal space were strongly correlated with pleasure as well as ratings of food quality, staff efficacy, willingness to return to the restaurant or recommend it to others, and overall satisfaction.

Not surprisingly, having enough personal space corresponded with perceptions that there was sufficient space between tables. Ratings of closeness and personal space were not affected by whether the respondents were seated at the experimental tables or at the control banquette, nor whether adjacent tables were occupied or not at the time the survey was completed.

Table 3.2. Correlations Among Personal Space, Satisfaction and Intention Variables

	Spearman's Rho	Pleased	Room	Food	Rushed	Staff	TooClose	Return	Recommend	Satisfied
Pleased	Correlation	1	.315(**)	.608(**)	-.180	.394(**)	-.217(*)	.555(**)	.720(**)	.372(**)
	Sig.	.	.003	.000	.099	.000	.046	.000	.000	.001
Room	Correlation		1	.259(*)	-.392(**)	.296(**)	-.500(**)	.308(**)	.380(**)	.355(**)
	Sig.		.	.017	.000	.006	.000	.004	.000	.001
Food	Correlation			1	-.191	.231(*)	-.110	.443(**)	.605(**)	.281(*)
	Sig.			.	.060	.034	.314	.000	.000	.010
Rushed	Correlation				1	-.205	.303(*)	-.177	-.217(*)	-.350 (**)
	Sig.				.	.060	.050	.106	.046	.001
Staff	Correlation					1	-.095	.339(**)	.453(**)	.376(**)
	Sig.					.	.388	.001	.000	.000
TooClose	Correlation						1	-.259(*)	-.330(**)	-.172
	Sig.						.	.017	.002	.122
Return	Correlation							1	.780(**)	.231(*)
	Sig.							.	.000	.036
Recommend	Correlation								1	.447(**)
	Sig.								.	.000
Satisfied	Correlation									1
	Sig.									.

Relationships Among Pleasure, Satisfaction and Behavior

As expected, there was a significant relationship between ratings of pleasure and overall satisfaction *(ρ = .372, p=.001)*. Following the method proposed by Baron and Kenny (1986), the mediating role of pleasure between ratings of personal space and overall satisfaction was tested and it was found that pleasure interacted with perceptions of adequate room *(F = 2.393, df = 6, p = .046)* but not table closeness *(F = .822, df = 8, p = .588)*. Ratings of the closeness of neighboring tables directly influenced ratings of satisfaction without mediation *(F = 2.692, df = 7, p =.023)*, but it was the pleasure obtained from having sufficient room at the table that affected overall satisfaction.

Surprisingly, there were no significant relationships between satisfaction and most approach behaviors. Satisfied guests were significantly more likely to be willing to recommend the restaurant to others *(ρ =.447, p=.000)* but were not any more likely to return, did not stay at table longer, and did not spend any more money than guests with lower levels of satisfaction (Table 3.3). Dining duration and spending were strongly correlated *(r = .551, p = .000)* but neither duration *(r = .107, p= .391)* nor spending *(r = -.031, p =.802)* appeared to be a function of guest satisfaction.

Table 3.3. Correlations Among Personal Space, Satisfaction and Behavioral Responses

		Enough Room	TooClose	Pleased	Satisfied	LogAvChk	DurMin
Enough Room	Correlation	1	-.500(**)	.315(**)	.355(**)	-.022	.028
	Sig.	.	.000	.003	.001	.855	.816
TooClose	Correlation		1	-.217(*)	-.172	-.066	-.133
	Sig.		.	.046	.122	.588	.277
Pleased	Correlation			1	.372(**)	.120	-.045
	Sig.			.	.001	.324	.711
Satisfied	Correlation				1	-.031	.107
	Sig.				.	.802	.391
LogAvChk	Correlation					1	.551(**)
	Sig					.	.000
DurMin	Correlation						1
	Sig.						.

Tests of Moderators. There were no significant differences in whether patrons felt their tables were too close across gender, age, dining frequency, or place of residence, but there were several significant two-way interactions when guests were asked whether they felt they had sufficient personal space at their tables. Gender interacted significantly with age *(F =5.500, df = 3, p = .025)* and with dining frequency *(F = 4.689, df = 2, p = .016)*: older women who dine out relatively infrequently perceived less personal space at their tables than did those who were younger, dined out more often, and/or were male. There was also a significant interaction between dining frequency and residence *(F = 3.054, df = 3, p =. 041)*. New Yorkers in general felt they had sufficient personal space (M = 6.26) when compared with residents of other areas (M = 5.55), but those city dwellers who ate out frequently were most comfortable with the amount of room at their tables (M = 6.42). These differences were not statistically significant.

Collectively, these results indicate that only three of the seven hypotheses were supported (Table 3.4). Perceptions of the adequacy of personal space and the closeness of other tables were significant contributors to dining pleasure, which in turn influenced overall satisfaction. However, there was no evidence that the table spacing itself generated discomfort or reduced approach behaviors, or that satisfied customers stayed any longer or spent any more than those who were less satisfied with their service experience.

Table 3.4. Summary of Results of Hypothesis Tests

Hypothesis		Statistical Test	Conclusion
1a	Diners seated at tables that are close together will feel that table spacing is inadequate when compared with tables that are spaced further apart.	$U = 541.0, z = -.461, p = .644$	Not supported
1b	Diners seated at tables that are close together will feel that they have less personal space at their table than diners seated at tables spaced further apart.	$U = 568.5, z = -.121, p = .904$	Not supported
2a	Diners that feel their tables are too close to others will rate their experience as less pleasurable when compared with the ratings of diners who do not feel other tables are too close.	$\rho = -.217, p = .046$	Supported
2b	Diners that feel they do not have enough personal space at their tables will rate their experience as less pleasurable when compared with the ratings of diners who feel that they have enough personal space.	$\rho = .315, p = .003$	Supported
3	Diners that rate their experience as less pleasant will express lower rates of satisfaction with the service experience than diners that rate their experience as more pleasurable.	$\rho = .372, p = .001$	Supported
4a	Diners that have lower ratings of overall satisfaction will have a shorter service duration than diners with higher ratings of satisfaction.	$r = .107, p = .391$	Not supported
4b	Diners that have lower ratings of satisfaction will spend less than diners with higher ratings of satisfaction.	$r = -.031, p = .802$	Not supported

Discussion

Restaurant guests seated at parallel tables spaced 6 inches apart did not have significantly different perceptions, attitudes or behaviors during their dining experiences when compared with guests seated at the same tables when they were spaced 12 inches or more apart. The mean responses to spatial perceptions varied in the hypothesized directions -- patrons at closer tables had a slightly lower mean for ratings of personal space and a slightly higher mean for ratings of closeness – but statistically the results were the same for both groups. An analysis of spending and duration had a similar outcome: diners at closely spaced tables had a slightly lower average check and shorter dining duration than diners at tables that were spaced more generously, but the differences between the groups was not statistically significant.

These findings came as a surprise because both the servicescape literature and the web-based survey of restaurant seating described in Chapter One suggest that close table spacing may be uncomfortable and may prompt avoidance behaviors. Having strangers within intimate distance has been widely found to generate negative responses in both laboratory and field settings (Hayduk, 1983), and as noted in Chapter One, consumers are very clear in their dislike of closely-spaced restaurant tables. And yet in this study, there were no significant effects of table spacing on satisfaction, spending, length of stay, or future intentions. Restaurant users may say they do not want tables to be too close together, but if there is any effect on guests' perceptions or behavior when they actually encounter closely spaced tables, it is not strong. This apparent paradox is actually not surprising. It has been well established that the relationship between consumers' intentions and actual behaviors is often very weak (Fishbein and Ajzen, 1975).

What appears to make a difference to consumers is not the explicit amount of space they have but how they feel about that space. Those who indicated that they felt they did not have adequate room at their table or between tables had significantly lower ratings of pleasure than those who were satisfied with their personal space. In fact, in this study the provision of adequate personal space had more influence on guests' overall satisfaction with the dining experience than did the food. Only ratings of the staff were more important to satisfaction. This finding provides support for Stokols' (1972) distinction between density and crowding: the objective density of the environment appears to be less influential on guest behaviors than the subjective response to that density.

One possible explanation for the relative lack of concern with tight inter-table spacing observed here is that the spacing was not unexpected given the location and concept of the restaurant where the research took place. Under expectancy disconfirmation theory, consumer satisfaction reflects the degree to which expectations are met and the relative importance of those expectations to the total experience (Parasuraman, Zeithaml and Berry, 1988; Oliver, 1997; Wirtz and Bateson, 1999). Dissatisfaction occurs when there is a gap between expectations and performance and the gap has importance or meaning for the experience. Although only a very small proportion of the respondents in this study were repeat customers who would likely already be familiar with the restaurant's seating layout, it is possible that the guests generally expected inter-table distance to be limited in a high-style New York City restaurant, possibly because they were already familiar with this common solution to expensive city real estate. The spacing distances tested here may have not represented a sufficient deviation from expectations to have a measurable effect on satisfaction.

This finding provides additional support for the importance of context to consumer perceptions and behaviors.

An alternative view might be that inter-table spacing was not particularly important to these guests and therefore could have little effect on their judgments of the dining experience. There is some evidence that consumers are less sensitive to crowding during hedonic dining experiences as opposed to utilitarian ones (Noone and Mattila, 2009), although this has not been tested in actual restaurant settings. This study did not collect ratings of importance for any elements of the dining experience which makes these explanations impossible to test given these data, but the earlier survey outlined in Chapter One strongly suggests that many consumers find close table spacing to be a significant concern. Determining expectations for and the relative importance of table spacing to the guest will be an important addition to any future study of personal space in similar settings.

Another possible explanation for these findings is that there was too little difference between 6 inches and 12 inches in the minds of the users, and that testing 18 or even 24 inch spacing against 6 inch spacing would uncover more significant effects. Efforts to test a third, much more generous distance in this study were rejected by the restaurant as being too disruptive to operations, but future work in other settings could examine a greater range of inter-table distances. In Study 1, 24 inch spacing was seen by consumers as being significantly less stressful and more comfortable than tables spaced at 6 or 12 inches, making this greater distance particularly interesting to study in a real environment.

This study confirms the well-established link between pleasure and satisfaction but identified no such connection between pleasure and spending or between pleasure and duration as has been found by others (Donovan et al., 1994; Sherman et al., 1997). There was no correlation between ratings of overall satisfaction and how much guests spent on their meal, nor between satisfaction and guests' willingness to return to the restaurant or recommend it to others. How long guests stayed was also not related to satisfaction. Guests who indicated a willingness to return were likely to recommend the restaurant, but there was no correlation between satisfaction rating and likelihood of return. One might attribute these findings to the relatively high proportion of non-residents in the study: those from out of town might have enjoyed their dining experience immensely but if they have no plans to visit the city again, they would be unlikely to return to the restaurant. However, there was no statistical support for this position, as residence did not appear to have a significant influence on willingness to return. This disconnect between satisfaction and behavioral outcomes warrants further study in real service environments, as much of the work that establishes a relationship between satisfaction and purchase behavior has been projective or retrospective in nature rather than based on actual experiences and purchasing data.

Managerial Implications

This study suggests that dining patrons may take notice when restaurant tables are positioned close together but do not have significantly different levels of satisfaction or behavior when they are seated in close quarters. At the restaurant studied here, there was no significant effect of table spacing on spending, duration, or satisfaction, even when tables were positioned as close as 6 inches apart.

This finding might be interpreted as license for restaurant operators to maximize capacity by placing tables as close together as possible, but while table spacing had no measurable effect on many of the outcomes in this study, it was not wholly without impact. Patrons who were less familiar with closely spaced tables were more uncomfortable with this arrangement and there were strong associations between ratings of personal space at table with perceptions of the food, service, and overall quality of the experience. The web-based survey found that most consumers feel very strongly negative toward tightly spaced restaurant seating. The wise service provider will take into account the needs and expectations of the user population when designing service environments, and consider age and familiarity with the service as inputs during the design process.

Limitations and Future Research

The findings in this study represent outcomes in a single upscale and high-style New York City restaurant with a clientele that skewed toward young and possibly more affluent diners[3]. It is very possible that other types of restaurants in other locations would not experience similar results, particularly if they attracted older guests or those that dine out relatively infrequently. Certainly this study will need to be replicated in many different dining environments before any definitive statement can be made about responses to table spacing in all types of restaurants.

[3] Roughly one third of diners in this restaurant that paid for their meals with a credit card used an American Express card, an indication of relative affluence. Further evidence of the spending power of the participants in this study is the fact that this restaurant has an average check of roughly $70 which is higher than the average check of the one hundred highest grossing US restaurants in 2009 (Killian, 2010).

One of the challenges of conducting research in a working service operation is ensuring that the methodology does not interfere with the normal operation of the service. The management and staff of the restaurant where the research took place were very accommodating but in order to maintain the quality of their service, they imposed limits on the number of nights that data could be collected, on the range and number of questions that could be included in the survey, and on the inter-table distances that could be tested. These limits translated into smaller than optimal sample sizes and observations at only two inter-table distances. The two distances tested are representative of a typical inter-table distance in many foodservice operations (12 inches) and an extremely tight distance that is rarely adopted (6 inches) but was considered to be likely to evoke a negative response. The fact that few such negative responses were observed at either distance suggests that testing additional distances in this particular restaurant may not have been particularly informative.

The methodology used in this study offers a strong case for the external validity of the findings because of the use of real customers responding to actual table spacing in a real dining environment. However, this study is only a quasi-experiment because there was no random assignment of participants to seating conditions, nor was there any method of controlling sample or party composition.

Despite the fact that ethnicity has been widely noted as influencing proxemic preferences and behaviors in public environments (Hall, 1966; Turley and Milliman, 2002), data on respondents' ethnicity were not collected at the request of the restaurant's management. This study has no way to identify whether what few significant effects of table spacing were measured could have been due to cultural differences.

The study was limited to a service setting where users were in pairs and seated facing one another at tables. This is a typical foodservice configuration that is also seen in libraries and on some forms of public transportation, but most other types of services have very different seating arrangements, notably entertainment venues and modes of transportation where consumers are seated side by side. The amount of personal space desired and the effect of spatial intrusions is possibly very different in these environments (Evans and Wener, 2007; Anderson, Pearo and Widener, 2008).

As a starting point, this study offers an intriguing working hypothesis for future research: that the explicit spacing between tables in a service setting has minimal effect on user satisfaction or behavior, whereas user perceptions of personal space do affect satisfaction with the service. Clearly, additional tests that use a broader set of consumer responses and larger sample sizes are called for. Of particular interest for restaurant settings appears to be age, residence, and dining frequency. Dining environments that are more casual and more formal than this restaurant will also need to be examined as will non-dining servicescapes in which users are seated in order to see if these effects are consistent across environments, service styles and price points.

APPENDICES

APPENDIX A

Survey Instrument for Web-Based Survey

SURVEY INSTRUMENT

I am: Male
Female

I am:
Under 21 years old
Between 21-35
Between 36-50
51 years old or older

I live in:
A major city (more than 1,000,000 people)
A smaller city (more than 50,000 but less than 1,000,000 people)
A suburban area (within twenty miles of a city with at least 50,000 people)
A rural area (no communities of more than 10,000 people within ten miles)

I am:
White/Caucasian
Black/African American
Hispanic (of any race)
Asian
Other/Mixed Race

I dine out at a sit-down restaurant:
More than three times a week
One to two times a week
One to times a month
Less than once a month
Don't know

I have worked in the restaurant industry at some point in my life.
Yes
No

You are on a romantic date [having dinner with an old friend/having a business meeting over dinner] at a nice restaurant, and have been seated at the table pictured below. ***[illustrated]***

Please respond to the questions below based on how you would feel about being seated at this table.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Sitting at this table, I would have the kind of experience I want	1	2	3	4	5	6	7
I would be overheard by other diners	1	2	3	4	5	6	7
I would disturb the next table if I had to get up	1	2	3	4	5	6	7
I would have an exciting meal experience	1	2	3	4	5	6	7
I would feel like I was being watched	1	2	3	4	5	6	7
I would feel like a VIP	1	2	3	4	5	6	7
I would feel like the Restaurant cares about me	1	2	3	4	5	6	7
I would feel exposed	1	2	3	4	5	6	7

Sitting at this table would make me feel:

Bothered	1	2	3	4	5	6	7
Contented	1	2	3	4	5	6	7
Uptight	1	2	3	4	5	6	7
Active	1	2	3	4	5	6	7
Comfortable	1	2	3	4	5	6	7
Vigorous	1	2	3	4	5	6	7
Distressed	1	2	3	4	5	6	7
Lively	1	2	3	4	5	6	7
Tense	1	2	3	4	5	6	7
Passive	1	2	3	4	5	6	7
Crowded	1	2	3	4	5	6	7
Worried	1	2	3	4	5	6	7
In control	1	2	3	4	5	6	7
Influential	1	2	3	4	5	6	7

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
It would be fine with me if I sat at this table	1	2	3	4	5	6	7
If the host were to show me to this table, I would ask to be sated somewhere else.	1	2	3	4	5	6	7

APPENDIX B

Survey Instrument for Field Study

T# _____ C# _____

PUBLIC

Cornell University
School of Hotel Administration

PUBLIC and Cornell University are working together to study how to create better dining experiences. You can help by taking a moment to complete the following short survey. Please leave your completed survey in the check folder, or you may give it to the hostess as you depart. Thank you for your feedback!

1. Please indicate your agreement with each of the following questions about your dining experience today.

(1 = Strongly Disagree, 7 = Strongly Agree)

I was pleased with my dining experience
1 2 3 4 5 6 7

I had enough room at my table
1 2 3 4 5 6 7

I was happy with my food
1 2 3 4 5 6 7

I felt rushed during my dining experience
1 2 3 4 5 6 7

The servers did a good job for me
1 2 3 4 5 6 7

My table was too close to other tables
1 2 3 4 5 6 7

I was very dissatisfied by my experience
1 2 3 4 5 6 7

2. Is this your first visit to PUBLIC? Yes No

If yes, how did you find out about PUBLIC?

_____

3. How likely are you to return to PUBLIC?
(1= Very Unlikely, 7 = Very Likely)

1 2 3 4 5 6 7

4. How likely are you to recommend PUBLIC to others?
(1= Very Unlikely, 7 = Very Likely)

1 2 3 4 5 6 7

5. Please tell us a little about yourself:

You are:

Male ____ Female _____

Your age is:

Under 25 ____ 25-35 _____ 36-49 _____ 50+ _____

How often do you eat out at a full-service restaurant for dinner?

More than twice a week ____
1-2 times a week ____
2-3 times a month ____
Once a month ____
Less than once a month ____

Where do you live?

New York City (5 boroughs) ____
Tri-State area (outside NYC) ____
Other US location ____ Where? _____
Outside the US ____ Where? _____

THANK YOU FOR PARTICIPATING AND FOR DINING WITH US TODAY.

REFERENCES

Aiello, J. R., DeRisi, D.T., Epstein, Y.M., and Karlin, R.A. (1977). Crowding and the role of interpersonal distance preference. *Sociometry*, 40(3), 271-282.

Aiello, J. R., Thompson, D.E., and Brodzinsky, D.M. (1983). How funny is crowding anyway? Effects of room size, group size, and the introduction of humor. *Basic and Applied Social Psychology*, 4(2), 193-207.

Altman, Irwin. (1975). *The environment and social behavior.* Monterey, CA: Brooks-Cole.

Andaleeb, S.S. and Conway, C. (2006). Customer satisfaction in the restaurant industry: An examination of the transaction-specific model. *Journal of Services Marketing*, 20(1), 3-11.

Anderson, S., Pearo, L.K., and Widener, S.K. (2008). Drivers of service satisfaction: Linking customer satisfaction to the service concept and customer characteristics. *Journal of Service Research*, 10(4), 365-381.

Andersson, T.D. and Mossberg, L. (2004). The dining experience: Do restaurants satisfy customer needs? *Food Service Technology,* 4(4), 171-177.

Argo, J. J., Dahl, D.W. and Manchanda, R.V. (2005). The influence of a mere social presence in a retail context. *Journal of Consumer Research*, 32(September), 207-212.

Argyle, M. and Dean, J. (1965). Eye-contact, distance and affiliation. *Sociometry,* 28(3), 289-304.

Auty, S. (1992). Consumer choice and segmentation in the restaurant industry. *The Service Industries Journal*, 12(3), 324-339.

Averill, J.R. (1973). Personal control over aversive stimuli and its relationship to stress. *Psychological Bulletin,* 80(4), 286-303.

Baker, J. (1987). The role of the environment in marketing services: The consumer perspective. In J. Czepiel, C.A. Congram, and J. Shanahan (Eds.), *The Services Challenge: Integrating for Competitive Advantage* (pp. 79-84). Chicago: American Marketing Association.

Barash, D. P. (1972). Human ethology: The snack-bar security syndrome. *Psychological Reports,* 31(2), 577-578.

Barker, R.T. and Pearce, C.G. (1990). The importance of proxemics at work. *Supervisory Management*, 35 (July), 10-12.

Baron, R.M. and Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.

Baum, A., Fisher, J.D. and Solomon, S.K. (1981). Type of information, familiarity, and the reduction of crowding stress. *Journal of Personality and Social Psychology,* 40(1), 11-23.

Baum, A., Shapiro, A., Murray, D., and Wideman, M.V. (1979). Interpersonal mediation of perceived crowding and control in residential dyads and triads. *Journal of Applied Social Psychology*, 9(6), 491-504.

Baum, A. and Valins, S. (1977). *Architecture and social behavior: Psychological studies of social density.* Hillsdale, NJ: Erlbaum.

Berkowitz, L. (1989). The frustration-aggression hypothesis: An examination and reformulation. *Psychological Bulletin*, 106(1), 59-73.

Berlyne, D.E. (1960) Conflict, arousal, and curiosity. Cited in A. Mehrabian and J.A. Russell (1974), *An approach to environmental psychology*. MIT Press: Cambridge.

Bitner, M.J. (1990). Evaluating service encounters: The effects of physical surroundings and employee responses. *Journal of Marketing*, 54(2), 69-82.

Bitner, M.J. (1992). Servicescapes: The impact of physical surroundings on customers and employees. *Journal of Marketing*, 56(2), 57-71.

Bowen, J.T. and Chen, S.L. (2001). The relationship between customer loyalty and customer satisfaction. *International Journal of Contemporary Hospitality Management,* 13(5), 213-217.

Brady, M.K. and Cronin, J. J. (2001). Some new thoughts on conceptualizing perceived service quality: A hierarchical approach. *Journal of Marketing*, 65(3), 34-49.

Burgoon, J. K. (1978). A communication model of personal space violations: Explication and an initial test. *Human Communication Research*, 4(2), 129-142.

Cappella, J.N. (1981). Mutual influence in expressive behavior: Adult-adult and infant-adult dyadic interaction. *Psychological Bulletin*, 89(1), 101-132.

Clark, T. (1990). International marketing and national character: A review and proposal for an integrative theory. *Journal of Marketing,* 54(4), 66-79.

Cohen, S. (1980). Aftereffects of stress on human performance and social behavior: A review of research and theory. *Psychological Bulletin*, 88(1), 82-108.

Cohen, S. and Sherrod, D.R. (1978). When density matters: Environmental control as a determinant of crowding effects in laboratory and residential settings. *Journal of Population*, 1(3), 189-202.

Dale, F.D. (1982). Patterns of preference in the indoor environment. Unpublished honors thesis. University of Michigan, Ann Arbor, MI. Cited in Waxman, Lisa. 2006. The coffee shop: Social and physical factors influencing place attachment. *Journal of Interior Design,* 31(3), 35-53.

Desor, J.A. 1972. Toward a psychological theory of crowding. *Journal of Personality and Social Psychology,* 21(1), 79-83.

Donovan, R. J. and Rossiter, J.R. (1982). Store atmosphere: An environmental psychology approach. *Journal of Retailing*, 58(1), 44-57.

Donovan, R.J., Rossiter, J.R., Marcoolyn, G. and Nesdale, A. (1994). Store atmosphere and purchasing behavior. *Journal of Retailing,* 70(3), 283-294.

Dooley, B.B. (1978). Effects of social density on men with "close" or "far" personal space. *Journal of Population*, 1(3), 251-265.

Dosey, M.A. and Meisels, M. (1969). Personal space and self-protection. *Journal of Personality and Social Psychology*, 11(2), 93-97.

Dubé, L., Renaghan, L., and Miller, J.M. (1994). Measuring customer satisfaction for strategic management. *Cornell Hotel and Restaurant Administration Quarterly*, 35(1), 39-47.

Dubé-Rioux, L., Schmitt, B., and Leclerc, F. (1989). Delays in service encounters as a source of consumer dissatisfaction. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, 2(1), 26-35.

Epstein, Y.M. and Karlin, R.A. (1975). Effects of acute experimental crowding. *Journal of Applied Social Psychology*, 5(1), 34-53.

Evans, G.W. (1978). Human spatial behavior: The arousal model. In A. Baum and Y.M. Epstein (Eds.), *Human response to crowding* (pp. 283-302) Hillsdale, NJ: Erlbaum.

Evans, G.W. (1979). Design implications of spatial research. In J.R. Aiello and A. Baum (Eds.), *Residential crowding and design* (pp. 197-216). New York: Plenum.

Evans, G.W. and Howard, R.B. (1973). Personal space. *Psychological Bulletin*, 80(4), 334-344.

Evans, G.W., Lepore, S.J., and Allen, K.M. (2000). Cross-cultural differences in tolerance for crowding: Fact or fiction? *Journal of Personality and Social Psychology*, 79(2), 204-210.

Evans, G.W. and McCoy, J.M. (1998). When buildings don't work: The role of architecture in human health. *Journal of Environmental Psychology*, 18(1), 85-94.

Evans, G.W., Rhee, E., Forbes, C., Allen, K. and Lepore, S.J. (2000). The meaning and efficacy of social withdrawal as a strategy for coping with chronic residential crowding. *Journal of Environmental Psychology,* 20(4), 335-342.

Evans, G.W., and Wener, R.E. (2007). Crowding and personal space invasion on the train: Please don't make me sit in the middle. *Journal of Environmental Psychology*, 27(1), 90-94.

Ezeh, C. and Harris, L.C. (2007). Servicescape research: A review and research agenda. *The Marketing Review*, 7(1), 59-78.

Felson, R. B. (1992). Kick 'em when they're down: Explanations of the relationship between stress and interpersonal aggression and violence. *The Sociological Quarterly*, 33(1), 1-16.

Fiore, A.M. and Kim, J. (2007). An integrative framework capturing experiential and utilitarian shopping experience. *International Journal of Retail and Distribution Management*, 35(6), 421-442.

Fishbein, M. and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Fisher, J.D., & Byrne, D. (1975). Too close for comfort: Sex differences in response to invasions of personal space. *Journal of Personality and Social Psychology*, 32(1), 15-21.

Fiske, S.T. and Linville, P.W. (1982). What does the schema concept buy us? *Personality and Social Psychology Bulletin*, 6(4), 543-557.

Freedman, J.L, Klevansky, S. and Ehlrich, P.R. (1971). The effects of crowding on human task performance. *Journal of Applied Social Psychology*, 1(1), 7-25.

Gardner, G.T. (1978). Effects of Federal human subjects regulations on data obtained in environmental stressor research. *Journal of Personality and Social Psychology*, 36(6), 628-634.

Geer, J. H., Davidson, G.C. and Gatchel, RJ. (1970). Reduction of stress in humans through nonveridical perceived control of aversive stimulation. *Journal of Personality and Social Psychology*, 16(4), 731-728.

Geer, J.H. and Maisel, E. (1972). Evaluating the effects of the prediction-control confound. *Journal of Personality and Social Psychology*, 23(3), 314-319.

Gifford, R. (1982). Projected interpersonal distance and orientation choices: Personality, sex and social situation. *Social Psychology Quarterly*, 45(3), 145-152.

Glass, D.C. and Singer, J.E. (1972). *Urban stress: Experiments on noise and social stressors.* New York: Academic Press.

Goffman, E. (1963). Behavior in public places: Notes on the social organization of gatherings. Free Press: New York.

Goodwin, C. (1998). Privacy as a dimension of service experience. In J. F. Sherry (Ed.), Servicescapes (pp. 539-564), Chicago, IL: American Marketing Association.

Graves, T.D., Graves, N.B., Semu,V.N., and Sam, I.A. (1982). Patterns of public drinking in a multi-ethnic society: a systematic observational study. Journal of Studies on Alcohol, 43(9), 990-1009.

Gupta, S., McLaughlin, E. and Gomez, M. (2007). Guest satisfaction and restaurant performance. Cornell Hotel and Restaurant Administration Quarterly, 48(3), 284-298.

Guyot, G.W., Byrd, G.R., and Caudle, R. (1980). Classroom setting: An expression of situational territoriality in humans. Small Group Behavior, 11(1), 120-128.

Hall, E.T. (1966). The hidden dimension. New York: Doubleday.

Hall, E.T. (1976). Beyond culture. New York: Doubleday.

Harrell, G.D., Hutt, M.D., and Anderson, J.C. (1980). Path analysis of buyer behavior under conditions of crowding. Journal of Marketing Research, 17(February), 45-41.

Hayduk, L.A. (1981). The shape of personal space: An experimental investigation. Canadian Journal of Behavioral Science, 13(1), 87-93.

Hayduk, L.A. (1983). Personal space: Where we now stand. Psychological Bulletin, 94(2), 293-335.

Horowitz, M., Duff, D., & Stratton, L. (1964). Body-buffer zone. Archives of General Psychiatry, 11(6), 651-656.

Huber, J.and McCann, J. (1982). The impact of inferential beliefs on product evaluations. Journal of Marketing Research, 19(3), 324-333.

Hui, M.K. and Bateson, J.E.G. (1991). Perceived control and the effects of crowding and consumer choice on the service experience. Journal of Consumer Research, 18 (September): 174-184.

Jang, S. and Namkung, Y. (2009). Perceived quality, emotions, and behavioral intentions: Application of an extended mehrabian-russell model to restaurants. Journal of Business Research, 62(4), 451-460.

Kaya, N. and Burgess, B. (2007). Territoriality: Seat preferences in different types of classroom arrangements. Environment and Behavior, 39(6), 859-876.

Kaya, N. and Erkip,F. (1999). Invasion of personal space under the condition of short-term crowding: A case study of an automatic teller machine. Journal of Environmental Psychology, 19(2), 183-189.

Kaya, N. and Weber, M.J. (2003). Cross-cultural differences in the perception of crowding and privacy regulation: American and Turkish students. Journal of Environmental Psychology, 23(3), 301-309.

Killian, K. (2010). R&I's top 100 independent restaurants 2010. Restaurants & Institutions Magazine, April 1, 2010.

Kim, D., Wen, L. and Doh, K. (2010). Does cultural difference affect customer's response in a crowded restaurant environment? A comparison of American versus Chinese customers. Journal of Hospitality & Tourism Research, 34(1), 102-123.

Kim, W.G. and Moon, Y.J. (2009). Customers' cognitive, emotional, and actionable response to the servicescape: A test of the moderating effect of the restaurant type. International Journal of Hospitality Management, 28(1), 144-156.

Kimes, S.E., Chase, R.B., Choi, S., Lee, P.Y., and Ngonzi, E.M. (1998). Restaurant revenue management. Cornell Hotel and Restaurant Administration Quarterly, 39(3), 32-40.

Kimes, S.E. and Robson, S.K.A. (2004). The impact of table characteristics on dining duration and spending. Cornell Hotel and Restaurant Administration Quarterly, 45(4), 333-346.

King, M.G., Burrows, G. D., and Stanley, G.V. (1983). Measurement of stress and arousal: Validation of the stress/arousal adjective checklist. British Journal of Psychology, 74(November), 473-479.

Kivela, J., Inbakaran, R. and Reece, J. (1999). Consumer research in the restaurant environment, Part 1: A conceptual model of dining satisfaction and return patronage. International Journal of Contemporary Hospitality Management, 11(5), 205-222.

Knowles, E. S. (1980). An affiliative conflict theory of personal and group spatial behavior. In P.B. Paulus (Ed.), The psychology of group influence (pp. 133-188). Hillsdale, NJ: Erlbaum.

Knowles, E.S., Kreuser, B., Hass, S., Hyde, M., and Schuchart, G.E. (1976). Group size and the extension of social space boundaries. Journal of Personality and Social Psychology, 33(5), 647-654.

Kotler, P. (1974). Atmospherics as a marketing tool. Journal of Retailing, 49(4), 48-65.

Kutner, D.H. Jr. (1973). Overcrowding: Human response to density and visual exposure. Human Relations, 26(1), 31-50.

Langer, E.J. and Saegert, S. (1977). Crowding and cognitive control. Journal of Personality and Social Psychology, 35(3), 175-182.

Langsrud, O. (2003). ANOVA for unbalanced data: Use Type II instead of Type III sums of squares. Statistics and Computing, 13(2), 163-167.

Leary, M.R. and Kowalski, R.M. (1990). Impression management: A literature review and two-component model. Psychological Bulletin, 107(1), 34-47.

Lee, J.A. (2000). Adapting Triandis' model of subjective culture and social behavior relations to consumer behavior. Journal of Consumer Psychology, 9(2), 117-126.

Lewis, K.M. (2000). When leaders display emotion: How followers respond to negative emotional expression of male and female leaders. Journal of Organizational Behavior, 21(2), 221-234.

Long, G.T. (1984). Psychological tension and closeness to others: Stress and interpersonal distance preference. Journal of Psychology, 117(1), 143-146.

Lott, D.F. and Sommer, R. (1967). Seating arrangement and status. Journal of Personality and Social Psychology, 7(1), 90-95.

Machleit, K.A., Kellaris, J.J., and Eroglu, S.A. (1994). Human versus spatial dimensions of crowding perceptions in retail environments: A note on their measurement and effect on shopper satisfaction. Marketing Letters, 5(2), 183-194.

Maher, A., and von Hippel, C. (2005). Individual differences in employee reactions to open-plan offices. Journal of Environmental Psychology, 25(2), 219-229.

Mattila, A.S. (2001). Emotional bonding and restaurant loyalty. Cornell Hotel and Restaurant Administrative Quarterly, 42(6), 73-79.

Mattila, A.S. and Wirtz, J. (2006). Arousal expectations and service evaluations. International Journal of Service Industry Management, 17(3), 229-244.

McKay, J.M., Pickens, J. and Stewart, A.L. (1996). Inventoried and observed stress in parent-child interactions. Current Psychology, 15(3), 223-234.

Mehrabian, A. and Diamond, S.G. (1971). Seating arrangement and conversation. Sociometry, 34(2), 281-289.

Mehrabian, A. and Russell, J.A. (1974). An approach to environmental psychology. Cambridge, MA: MIT Press.

Middlemist, R. Dennis, Knowles, E.S., and Matter, C.F. (1976). Personal space invasions in the lavatory: Suggestive evidence for arousal. Journal of Personality and Social Psychology, 33(5), 541-546.

Nagar, D. and Pandey, J. (1987). Affect and performance on cognitive task as a function of crowding and noise. Journal of Applied Social Psychology, 17(2), 147-157.

National Restaurant Association. Restaurant Industry Pocket Factbook 2010. Retrieved from http://www.restaurant.org/pdfs/research/2010Forecast_PFB.pdf

Newman, A.J. (2007). Uncovering dimensionality in the servicescape: Towards legibility. Service Industries Journal, 27(1), 15-28.

Nicosia, G.J., Hyman, D., Karlin, R.A., Epstein, Y.M. and Aiello, J.R. (1979). Effects of bodily contact on reactions to crowding. Journal of Applied Social Psychology, 9(6), 508-523.

Noone, B.M., Kimes, S.E., Mattila, A.S., and Wirtz, J. (2007). The effect of meal pace on customer satisfaction. Cornell Hotel and Restaurant Administration Quarterly, 48(3), 231-244.

Noone, B.M. and Mattila, A.S. (2009). Consumer reaction to crowding for extended service encounters. Managing Service Quality, 19(1), 31-41.

Oliver, R.L. (1997). Satisfaction: A behavioral perspective on the consumer. New York: McGraw-Hill.

Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1988). SERVQUAL: A multi-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64(1), 12-40.

Parrish, J.T., Berry, L.L. and Lam, S.Y. (2008). The effect of the servicescape on service workers. Journal of Service Research, 10(3), 220-238.

Patterson, M.L., Kelly, C.E., Kondracki, B.A., and Wulf, L.J. (1979). Effects of seating arrangement on small-group behavior. Social Psychology Quarterly, 42(2), 180-185.

Patterson, M.L., Mullens, S., and Romano, J. (1971). Compensatory reactions to spatial intrusion. Sociometry, 34(1), 114-121.

Pedersen, D.M. (1994). Privacy preferences and classroom seat location. Social Behavior and Personality, 22(4), 393-398.

Proshansky, H.M., Ittelson, W.H., and Rivlin, L.G. (1974). Freedom of choice and behavior in a physical setting. In H.M. Proshansky, W.H. Ittelson, & L.G. Rivlin

(Eds.), Environmental Psychology (pp. 170-181). New York: Holt, Rinehart and Winston.

Richins, M.L. 1983. Negative word-of-mouth by dissatisfied customers: A pilot study. Journal of Marketing, 47(1), 68-78.

Robson, S.K.A. (2008). Scenes from a restaurant: Privacy regulation in stressful situations. Journal of Environmental Psychology, 28(4), 373-378.

Rozelle, R.M. and Baxter, J.C. (1978). Interpretation of nonverbal behavior in a role-defined interaction sequence – the police-citizen encounter. Environmental Psychology and Nonverbal Behavior, 2(2), 167-180.

Saegert, S., Mackintosh, E., and West, S. (1975). Two studies of crowding in urban public spaces. Environment and Behavior, 7(2), 159-184.

Schachter, S. and Singer, J. (1962). Cognitive, social and physiological determinants of emotional state. Psychological Review, 69(5), 379-399.

Schmidt, D.E. and Keating, J.P. (1979). Human crowding and personal control: An integration of the research. Psychological Bulletin, 86(6), 680-700.

Sherman, E., Mathur, A. and Smith, R.B. (1997). Store environment and consumer purchase behavior: Mediating role of consumer emotions. Psychology and Marketing, 14(4), 361-378.

Sherrod, D.R. (1974). Crowding, perceived control, and behavioral aftereffects. Journal of Applied Social Psychology, 4(2), 171-186.

Shostack, G. L. (1977). Breaking free from product marketing. Journal of Marketing, 41 (April), 73-80.

Smith, A.P. and Miles, C. (1986). The effects of lunch on cognitive vigilance tasks. Ergonomics, 29(6), 1251-1261.

Sommer, R. (1959). Studies in personal space. Sociometry, 22(3), 247-260.

Sommer, R. (1962). The distance for comfortable conversation: A further study. Sociometry, 25(1), 111-116.

Sommer, R. (1965). Further studies of small group ecology. Sociometry, 28(4), 337-348.

Sommer, R. (1969). Personal space: The behavioral basis of design. Englewood Cliffs, NJ: Prentice-Hall.

Sommer, R. and Sommer, B.A. (1989). Social facilitation effects in coffeehouses. Environment and Behavior, 21(6), 651-666.

Staub, E., Tursky, B., and Schwartz, G.E. (1971). Self-control and predictability: Their effects on reactions to aversive stimulation. Journal of Personality and Social Psychology, 18(2), 157-162.

Stokols, D.(1972). On the distinction between density and crowding: Some implications for future research. Psychological Review, 79(3), 275-278.

Sundstrom, E. (1975). An experimental study of crowding: Effects of room size, intrusion, and goal blocking on nonverbal behavior, self-disclosure, and self-reported stress. Journal of Personality and Social Psychology, 32(4), 645-654.

Sundstrom, E. and Altman, I. (1976). Interpersonal relationships and personal space: Research review and theoretical model. Human Ecology, 4(1), 47-67.

Tombs, A. and McColl-Kennedy, J.R. (2003). Social-servicescape conceptual model. Marketing Theory, 3(4), 447-475.

Tse, A.C.B., Sin, L., and Yim, F.H.K. (2002). How a crowded restaurant affects consumers' attribution behavior. International Journal of Hospitality Management, 21(4), 449-454.

Turley, L.W. and Milliman, R.E. (2002). Atmospheric effects on shopping behavior: A review of the experimental evidence. Journal of Business Research, 49(August), 193-211.

Van Rompay, T.J.L., Vonk, D.J., and Fransen, M.L. (2009). The eye of the camera: Effects of security cameras on pro-social behavior. Environment and Behavior, 41(1), 60-74.

Wakefield, K.L. and Blodgett, J.G. (1996). The effect of the servicescape on customers' behavioral intentions in leisure service settings. Journal of Services Marketing, 10(6), 45-61.

Webb, W.M. and Worchel, S. (1993). Prior experience and expectation in the context of crowding. Journal of Personality and Social Psychology, 65(3), 512-521.

Wirtz, J. and Bateson, J.E.G. (1999). Consumer satisfaction with services: Integrating the environment perspective in services marketing into the traditional disconfirmation paradigm. Journal of Business Research, 44(1), 55-66.

Wirtz, J., Mattila, A.S., and Tan, R.L.P. (2000). The moderating role of target-arousal on the impact of affect on satisfaction: An examination in the context of service experiences. Journal of Retailing, 76(3), 347-365.

Wohlwill, J.F. (1974). Human adaptation to levels of environmental stimulation. Human Ecology, 2(2), 127-147.

Worchel, S. (1986). The influence of contextual variables on interpersonal spacing. Journal of Nonverbal Behavior, 10(4), 230-254.

Worchel, S. and Teddlie, C. (1976). The experience of crowding: A two-factor theory. Journal of Personality and Social Psychology, 34(1), 30-40.

Yildirim, K. and Akalin-Baskaya, A. (2007). Perceived crowding in a café/restaurant with different seating densities. Building and Environment, 42(9), 3410-3417.

Yildirim, K., Akalin-Baskaya, A., and Celebi, M. (2007). The effects of window proximity, partition height, and gender on perceptions of open-plan offices. Journal of Environmental Psychology, 27(2), 154-165.

Zeithaml, V.A. (1988). Consumer perceptions of price, quality and value: A means-end model and synthesis of evidence. Journal of Marketing, 52(3), 2-22.